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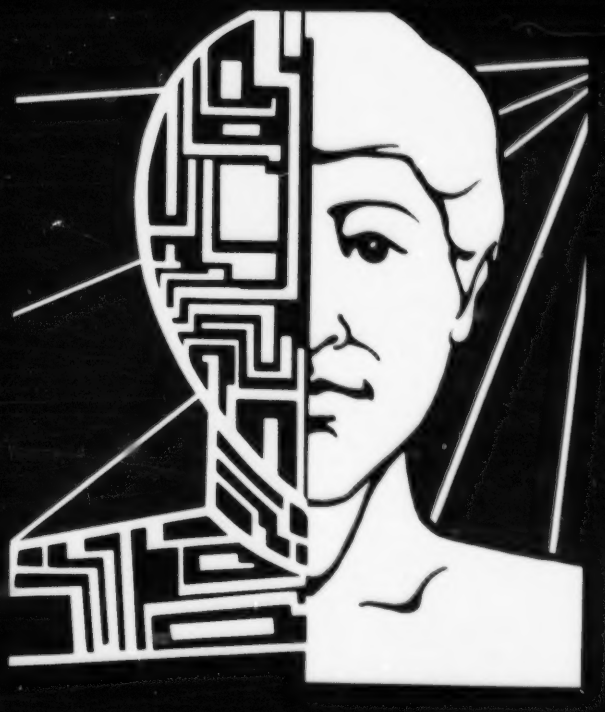
The Electronic Library

Moving to the Year 2000



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THE ELECTRONIC LIBRARY:
Moving to the Year 2000

Proceedings of a
Conference

SPONSORED BY
THE ONTARIO MINISTRY OF
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Toronto, 1987

EDITOR'S NOTE

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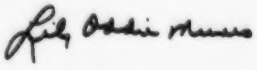
MINISTER'S MESSAGE

Keeping up with technology in this increasingly automated age is one of the pressing problems facing large and medium sized libraries in Ontario, as we approach the signpost of a new century. Automation is constantly changing our environment and libraries, as information centres, must respond to these advances.

In September, 1985 I had the pleasure of officially opening **Libraries 2000: A Futures Symposium** in Toronto. That symposium provided a challenging look into the future of our society. One of the common themes that emerged was the impact of technology on all aspects of our society. Computer technology in particular is having a major influence on libraries. While large public libraries in Ontario have been using computer technology for more than a decade, much of that technology is now out-dated or inadequate for current and future needs.

My ministry has an important commitment to ensure that public library boards move effectively into the future, a future that will be increasingly automated. As a follow-up to the Libraries 2000 symposium, my ministry is pleased to present **The Electronic Library: Moving to the Year 2000,** a conference examining the issues of second generation automation.

I am certain that **The Electronic Library** will help large and medium-sized libraries face the automation challenge in their key role of providing access to information.



Lily Oddie Munro, Minister,
Ontario Ministry of Culture
and Communications

TABLE OF CONTENTS

1 **OPENING REMARKS**
David P. Silcox, Deputy Minister,
Ministry of Culture and Communications

5 **WELCOME**
Jane Cooney, Canadian Literacy Association

7 **SETTING THE SCENE: WHERE WE ARE, WHERE WE'RE GOING.**
Maureen Killeen,
Libraries and Community Information Branch,
Ministry of Culture and Communications

11 **SYSTEMS REPLACEMENT AND UPGRADES: KEY MANAGEMENT ISSUES**
Wayne Peters, Partner, Information Technology Group, Woods Gordon Management Consultants

17 **MAKING THE CASE IN THE POLITICAL ARENA**
Jean Orpwood, Director and Morris Zbar, Chairman, North York Public Library; Jim McGuffin, Alderman, City of North York

29 **PUBLIC ACCESS TO ELECTRONIC INFORMATION: DOES ONE-STOP SHOPPING MAKE SENSE?**
Charles Hildreth, Chief Consulting Scientist, READ Ltd.

39 **INFORMATION SERVICES: ONLINE TRENDS AND ISSUES**
John Helliwell, *P.C. Week*

51 **INFORMATION: A RIGHT OR A PRIVILEGE?**
Ken Dowlin, Director, Pike's Peak Library District

OPENING REMARKS

**David P. Silcox, Deputy Minister,
Ministry of Culture and Communications**

Good Morning everyone. The Minister asked me to bring you her greetings this morning along with the wish that you have a very good day at **The Electronic Library** conference. Given the numbers attending, the conference has certainly hit a responsive chord. Of course, it's not surprising considering the importance of today's conference topic - **The Electronic Library: Moving to the year 2000.** As you may realize, this is a follow-up symposium to the highly successful 1985 **Libraries 2000** Conference so I'm sure you'll find it equally stimulating and thought-provoking.

When I was preparing for today's conference I found a couple of interesting statistics some of you may already know. They're worth reiterating because they demonstrate graphically the magnitude of the challenge facing our public library system today.

Between 6,000 and 7,000 scientific articles are written each day, and scientific and technical information now doubles every five and a half years. And here's another mind-boggling statistic: it would take seventeen years of reading twenty-four hours a day to read one year's publishing output from Canada and the U.S. alone. Add to this AM and FM radio, regular and pay TV, movies, magazines and a host of other information vehicles, automated and otherwise, and you have the enormous scope of our information age.

The proliferation of information today is astounding. We are the "global village" foreseen by the late Marshall McLuhan and futurists such as Frank Ogden and Alvin Toffler.

It is almost axiomatic to say we are moving from an economy based on the harvesting of natural resources and the mass production of physical goods, to an information-based economy characterized by a better-educated population, rapid expansion of the service sector—which includes public libraries—and a culture stressing the quality of experience over the quantity of accumulated goods.

I'm citing these figures to provide a basis for today's forum. They give us a larger picture of the challenge our society and our libraries are handling each and every day of the year, a challenge that is even more significant for larger libraries, which are on the leading edge in all aspects of this information revolution and which must be prepared to answer the difficult questions that arise.

And let's look at some of these questions:

Notwithstanding the mandate of collecting and preserving information, can libraries hope to assemble and house the massive amounts of information being produced? On what basis will the library's scarce resources be utilized for library collections? If information is available through information utilities, should libraries duplicate the service or subscribe to it? What role should foreign-based utilities, with their automated databases, play in our libraries, when we

all agree that libraries are important cultural institutions?

In short, who is to decide and control which information we store and who is to have access to it? From where? At what cost? And to whom? If we say that information is a critical element in a democratic society, do we specify that only certain information in certain formats will be freely accessible? Will libraries accentuate or ameliorate the gap between the information rich and information poor?

As you will realize, the road to the Information Age is strewn with a lot of jarring quandaries.

In asking these questions, I am aware that through programming, services, and use of technology, larger libraries are providing the whole library community with leadership and guidance in many areas and on many of these issues.

Mind you, this isn't really surprising when you realize that eighty per cent of all library professionals in Ontario work for library boards in communities with populations of more than 50,000 and that these libraries receive seventy-six per cent of the total funding in Ontario for public libraries. It's also interesting to note that these same libraries serve only sixty-two per cent of the population. The bottom line is that we all appreciate the valuable skills and resources you have contributed to the entire library community.

These contributions have not only made our library network stronger, but have allowed our society to become better informed, a critical requirement in a democratic society.

Our larger libraries have a big responsibility. This is reflected in the challenges confronting our senior library administrators. Today, the C.E.Os of larger libraries are facing more demands from their communities. The expectations of library users are higher, while the new Public Libraries Act makes the C.E.O's role more demanding, and accountable in a variety of new ways to both library boards and municipal councils. And the rapidly changing technologies that you will hear about today do not make this job any easier.

It is interesting to note that upon assuming office, the Premier of Ontario defined three major challenges or priorities for his new government:

* achieving excellence in education;
* dealing with the impact of demographic changes; and
* adjusting to a post-industrial society.

You will immediately note how libraries are unique in that they encompass each of these in some way or other.

This conference is just one way we at the ministry are trying to help you with the challenges that lie ahead as we approach the millennium. It's a first step towards providing programs specifically targeted for medium and larger libraries. One key area is staff training and development. Through training and development, such as this conference for instance, our public library administration will be strengthened and prepared for the library's changing environment. In this regard, I'd like to announce that our ministry will be initiating two studies which have been specifically identified for larger libraries.

The first, will investigate first whether and then how special collections in larger libraries can be rationalized. In a way this study is a derivative of the last copy collection or the Ontario Joint Fiction Reserve which the Ministry supports through OLS-Trent.

The second study has its genesis in the Ontario Public Library Program Review recommendation that the Province should investigate how the managerial effectiveness of delivering public library service throughout Ontario can be enhanced. This is one of the few recommendations left for implementation from the Review.

This study will examine the potential usefulness of a management development office or a clearing house for public library services and technologies. This study will be related to the library management program which the Libraries Branch is currently discussing with York University and which involves CELPLO (Chief Executives of Large Public Libraries in Ontario) and AMPLO (Association of Medium Public Libraries in Ontario) in its design. Both studies will help our library system operate more effectively and efficiently with less duplication of effort.

In addition to this, we're also making major strides in implementing new technology. The Ontario Public Library Information Network (OPLIN) is currently operating in eighty libraries throughout the Province with a total of 150 libraries to come on during fiscal year 1987/88. It has successfully met its primary objective of facilitating resource sharing.

It's especially gratifying to note that small and medium libraries can satisfy on average about forty per cent of the inter-library loan needs before accessing the larger resource libraries. One of the major benefits of this initiative has been the introduction of new technology throughout the library system. It also allows the libraries in the Province to use the same level of technology, thereby avoiding complications. When the project is completed later this year those 150 libraries will have microcomputer work stations as well as the ability to access remote databases and the skills to use electronic mail.

Likewise, the "Library Cooperative Automation Program" and the "Northern Libraries Automation Program" have been instrumental in delivering new technology to our medium and larger libraries. These programs have channeled more than three million dollars involving fifty-two projects and we're looking forward to continued success in the future.

In conclusion, I'd like to say since coming to the ministry more than a year ago, I've seen tremendous achievements. I've had the good fortune of meeting many of you at various functions and I want to commend each of you on the terrific job you're doing.

By working with associations such as the Ontario Library Association, CELPLO and AMPLO we're able to keep in touch with your thoughts and views. This interaction is extremely important to the ministry because we count on your ideas, insights and concerns to help us provide better programming. I'm looking forward to working even closer with you as we approach the year 2000. And when we enter the twenty-first century, we still want to have the best public library system in the world.

WELCOME

Jane Cooney,
Canadian Library Association

Jane Cooney's career spans more than 20 years as a librarian and association executive director. Before accepting her current position as Executive Director of the Canadian Library Association, Ms. Cooney was Vice-President and Director of Information Services with the Bank Marketing Association of Chicago. Among her many accomplishments is the development, production and marketing of Financial Industry Information Service, an online database.

Ms. Cooney was the moderator for "The Electronic Library: Moving to the Year 2000".

It is a great pleasure for me to be here today as your moderator for this important conference. Your program organizers from the Libraries and Community Information Branch have brought together a stellar group who will be sharing their experiences with us as we explore various aspects of moving the library world towards the year 2000. My role will be to help keep today's program on track and on time.

In my new position as Executive Director of the Canadian Library Association, I have become acutely aware of the need for continuing education on technology topics. Our constituents from all kinds of institutions have shown that they want to develop the expertise needed to exploit the opportunities inherent in the electronic library. The Ontario Ministry of Culture and Communications is to be congratulated for providing this kind of help to Ontario public libraries through a forum such as this.

We hope this conference will provide new ideas for managing and operating the electronic library, and that you will be inspired to continue to adapt and respond to new technologies for the benefit of your library's users.

SETTING THE SCENE: WHERE WE ARE, WHERE WE'RE GOING

Maureen Killeen,
Ministry of Culture and Communications

Maureen Killeen is with the Technical Development Unit, Libraries and Community Information Branch of the Ministry of Culture and Communications. She is responsible for training for the Ontario Public Library Information Network (OPLIN).

I'm here to set the scene for the day by reviewing where we've come from and describing where I think we're going with computers in libraries in the future.

Figure one is a graph showing library technology development from 1970 to the year 2000. You can see that significant new technology is introduced about every five years; it is interesting to note that in the first five years after a technology has been introduced, only a few pioneers use it. Around the fifth year, the technology has become accepted and there is a corresponding increase in its use.

Around 1970, services began to be offered on mainframe computers. This consisted of local libraries dialing into a company like Utlas in Canada or OCLC in the United States to do shared cataloguing. I believe OCLC started up in '72 and Utlas in '73. Around 1975, minicomputers appeared on the scene. GEAC developed its circulation system at Guelph and Waterloo and by 1979 there were two public libraries in Ontario with circulation systems running on minicomputers.

With the 1980s came the advent of microcomputers, and if you remember those machines were very small. I think the first one I ever used had only 64K memory; but these days the standard is 256K and many systems have 640K.

In 1985, we saw the introduction of optical disc technology. When I say optical disc systems, I'm referring to CD-ROM technology, which is the type of optical disc system most popular in libraries. Just to give you a bit of a background, at ALA in 1985, there were only about three CD-ROM products shown on the exhibit floor. By 1986, there were about forty-five products exhibited. This year we know of well over 100 products that are available for libraries.

If this pattern of introducing a new technology every five years continues, by 1990 and '95, libraries will have to absorb two new technologies that no one has dreamed of yet. It's a sobering thought.

Figure two shows what the library automation scene looked like for public libraries in Ontario in 1974. You can see that the four pioneers were: Metro Central, North York, Mississauga, and Hamilton. They started using the Utlas database to do shared cataloguing in the early 1970s. Figure three shows the scene five years later. By 1979 a great many more libraries are starting to use the Utlas shared cataloguing service, including the northern libraries with the Tri-Regional Catalogue. In Figure three

you also see the first minicomputer based circulation systems going into the province, in London and Oakville.

Figure four shows the scene in 1984. There is more progression with computerized cataloguing and there are now some libraries with circulation and cataloguing systems operating together. And we see the start of co-operative systems, with the first local network, called Halinet, connecting the libraries of Halton Hills, Oakville and Milton.

Figure five shows the scene today. By 1987 there are a few more networks, with the York Public Library network and the Ajax-Whitby Co-op.

Figure six shows libraries participating in the Automation Program for Small Libraries, introduced by the Ministry in 1985. When I say small libraries, I'm referring to libraries serving a population of fewer than 50,000 people. There are many feasibility studies and system selections underway as part of the program. In fact, there are about fifty libraries now throughout the province that are going through the same sort of system selection process that a lot of you have already undergone.

One of the other consequences, of course, of technological development, is the advance in resource sharing networks. Figure seven shows what resource sharing or interlibrary loan looked like in the province in 1984. In Voyageur and James Bay, there is a system based on a microfiche catalogue produced from the Utlas database, called the Tri-Regional catalogue. In Saugeen and Trent, there is an electronic system that is used for interlibrary loan. In the other regions, there is a combination of telex or teleprinter being used.

With the Ontario Public Library Information Network (OPLIN), libraries use the Utlas REFCATSS System for print interlibrary loan and the CNCP Messaging System for film interlibrary loan. Figure eight shows the pilot project area of Escarpment where each library was given a microcomputer work station and staff were trained to use Utlas and CNCP to do their interlibrary loan messaging. The pilot project was a success and we started to expand into other areas. Figure nine shows the extension of OPLIN to Voyageur, James Bay, Rideau and Thames in '86/'87.

In '87/'88, as Figure ten shows, implementation will take place in Nipigon, Saugeen and in the Metro Toronto area libraries. In Trent, we currently have a study underway to look at ways of interfacing their system with OPLIN.

Now that we've seen where we have come from, let's take a look at where we're going. What I see are five major trends for the future.

The first trend is system replacement and I'll talk about that briefly, because that's what our next set of speakers is going to be discussing in greater detail. Why do you need system replacement? Well, user experience creates demand for more material in the database. People like using on-line catalogues. They want to see more things in there.

As people use the system, their needs become more sophisticated. They want more functions and they need more terminals for access. Therefore, the hardware and the software become obsolete. If you want more material in the database, you need more storage. If you

want more functions, you need more sophisticated software. If you want more terminals for access, you need more computer power. If we consider the life cycle of a computer is five to seven years, then libraries must make two full system replacements before the year 2,000 or, put another way, in the next thirteen years. If that's a shock to you, it should be.

There's a continuing need for RECON. You want to add more materials to the database and, of course, this is expensive. Also, change implies an upheaval for library staff. They might have been trained on one system and now they're going to have to learn another one. I guess you've all realized by now, that once you've started on the road to library automation, there is no turning back even though some of you would probably like to at certain times.

The second trend that I see is technology proliferation. A lot of you are already using a lot of computer applications in your libraries, different on-line services, circulation, and on-line catalogue systems. You're also starting to get demands for home access, and indeed, the Brampton Public Library has started a feasibility study on that issue. You are using telecommunications for interlibrary loan and messaging between libraries. You are also using microcomputers for office automation. You are probably all using Lotus 1-2-3 for spreadsheet applications or dBASE III Plus for some database management projects. Soon you will have CD-ROM.

With CD-ROM we are beginning to see a blurring of the technology. You can do cataloguing with CD-ROM, book ordering, access on-line databases, and search publications such as the Grolier Encyclopedia.

What are the implications of this technology proliferation? Ten years ago there was usually one person in a library who knew about automation. Now there are so many more functions that are automated that many more staff now have computer expertise. So we are seeing a diffusion of responsibility for computer expertise in management. This expertise is becoming an integral part of the middle-management function. Librarians have to know how to manage technology as well as the other resources in the library.

Automation is also becoming a basic skill for all library workers. There are library technicians doing on-line cataloguing in the cataloguing departments, checking out books in circulation, and soon they will be doing on-line searches to remote databases in the reference department—if they aren't doing it already.

I think the other implication of this technology proliferation is that we've finally realized that there is an end to the search for the fully-integrated system. There are so many technologies out there, that now the challenge is to find the technology that is best suited to your application. So we're finding more and more emphasis now on system connections. We need our machines to talk to each other.

The third trend that we identified is the constant introduction of new technology and the constant need to keep evaluating the best technology for your function. You've got to pick out the best options. It means constant retraining of your library staff, and basically, the umbrella statement "learning how to

manage change."

The fourth trend is that the major technological impact for the 1990s will be on reference services. In the 1970s, if you look back to the graph chart that I showed at the beginning of this presentation, we saw that the major impact was on Technical Services. This was the department that signed on to the remote databases to do shared cataloguing. In the 1980s, we saw the major impact hitting the circulation staff with the advent of the minicomputers for circulation control. In the 1990s, the impact will be felt in the reference department. Both CD-ROM technology and on-line catalogue implementation will cause significant changes.

CD-ROM will provide electronic reference collections, and will make database access affordable. In the past, accessing a remote database was a pay-as-you-go situation, and for public libraries in particular, this cost was difficult to pass along to the patron. Now that CD-ROM databases can be purchased on a subscription basis, it's the same as buying a periodical subscription. Another change is that the public will want to access those databases directly and this will result in a changing role for the reference librarians. They will now be showing the patrons how to do searches on on-line databases. CD-ROM will also create space and equipment demands. If you're going to have CD-ROM readers, you've got to have places to put them.

The fifth trend is increasing user demands, and I can really speak for this from experience. I go out and train people in the use of microcomputer technology. I've found that on a given day I'll sit down and literally show somebody how to turn on a microcomputer and within one month that same person will be doing gruelling searches with Boolean logic. We are talking about people who become hooked and once hooked, they're really hooked.

Children are becoming more and more computer literate. In the schools, they learn word processing and database creation, and of course, we are all familiar with their fascination with interactive games. In a lot of school libraries children are using on-line catalogues. Those little gaffers are sitting down and doing on-line searching of remote databases and some of them are using CD-ROM readers. These are the adult public library patrons of the future.

The current adult population is becoming more and more computer literate because of microcomputers in the workplace. Not only are they using them at work, they're also starting to use them at home and creating the demand for home access to library collections.

Managing change, managing the electronic library, that really is the challenge. We've talked about how managing technology has become an essential skill for middle-management librarians. With the advent of all of these new technologies, the ultimate challenge is the management of change.

SYSTEMS REPLACEMENT AND UPGRADES: KEY MANAGEMENT ISSUES

Wayne Peters, Woods Gordon

Wayne Peters was an information systems and telecommunications consultant with Woods Gordon and is currently with Information Technologies Strategies. He has conducted numerous reviews and strategic planning projects for organizations as diverse as Cadillac Fairview, the Toronto Transit Commission, and the University of Toronto. He is the author of several articles on data processing applications and is a frequent speaker and seminar leader.

In 1985 Woods Gordon was engaged by the North York Public Library to review their present system, project future requirements, and recommend a new system to meet those needs.

What I want to talk about first is how the replacement issue surfaces. Most of you are chief librarians and/or trustees. You don't suddenly wake up one morning and say, "I think I'll replace our system." It usually comes at the conclusion of a long period of frustration. What I want to talk about is what causes the frustration, and how to recognize the symptoms. Then I'll discuss some of the reasons why you should be persuaded to replace and/or upgrade your system.

Next I'll deal with the fun part—the risks. Computers are risky. Is there anybody here who disagrees with that? In many cases, you may find you are playing career roulette by recommending to the board of trustees or to the city council or whoever, that you should spend three million dollars replacing the system. I know at least one chief librarian in the audience today who went through that in the last three years and she'll be speaking a little later on the panel. So I want to talk about the risks and how to minimize them.

Finally, I want to summarize the overall gut issues that you people face.

As I mentioned earlier, the replacement issue usually surfaces at the end of a long period of frustration. Most people underestimate the demands on the computer, especially if you have an on-line component to your computer. Once those screens go in, people dream up a thousand more uses for them. So you can bet your dollar, no matter how much hardware capacity you install, it isn't going to be enough.

Slow response times. Those of you who were on Utlas know that in the early 1980s there was a response time problem. And we ended up having to double the hardware capacity on that system.

Obviously, you may need increased functionality. Maureen Killeen made the point that the applications should inter-relate. Perhaps you bought old software that doesn't inter-relate adequately and you want to upgrade it. You may have a vendor who doesn't respond very well to requests for changes, for enhancements, or for linkages to other applications. It may be that the company has de-emphasized this product line and is developing a new one. So you may have old technology.

The hardware may be inadequate. Maybe you've got an old line of hardware and as you try to add two or three more branches you find out, oops, it can't handle it and you can't upgrade it so you're in a box. You may have a major expansion in the load, perhaps a municipal merger or something like that, where you have to handle twice the volume or more.

Vendor performance and vendor instability. Is there anybody who agrees that this might force you to consider a change? I know there are a lot of vendors in the audience and I don't want to be sued, but there are vendors who come and go for the simple reason that it is not a huge marketplace. It's a very competitive marketplace, it's a niche marketplace, and there's a lot of American competition emerging here now. So vendor instability is something that may give you cause to reflect.

Those are the main reasons why you get frustrated and why you may be forced to conclude you need an upgrade.

Recognizing the need for a system replacement is tough. It usually means spending several million dollars or at least several hundred thousand dollars of taxpayers' money, so it's not something to be done lightly. And don't forget, you have to sell it to the people with the money, the councillors.

In preparing this presentation, I tried to write down what I thought were the key issues and I want to spend a little bit of time on each one of them. These are the things you have to do correctly or you will be playing "you bet your career." You're playing that anyway. But maybe you can play it better by the end of this presentation.

More than anything else, you must establish the structure of the replacement process at the front end. Otherwise it is going to take twice as long and cost three times as much. Without the appropriate structure, you may reach the wrong conclusions. Most importantly, get a very senior and very active steering committee operating from the beginning. This committee has to be run by the chief librarian and no one else.

Also, you'll need some kind of a system strategy. There are enormous numbers of applications available for you people now. There's a lot of software out there. As part of the strategy, you need to know what applications you're going to need, how they are going to fit together, what the estimated costs are and so on. So in other words, you need an architecture, a game plan, and usually you wrap that all up in something called a system strategy.

You have to assign priorities to the application areas. You cannot put every application in at once. You may talk to some vendors who will tell you to do that, but I can assure you it doesn't work. If you have a current vendor, it is both tactically and politically wise to include him as a bidder. Because you are going to tender for new systems, you may want to restructure your current relationship with that vendor. You can use the tendering process to improve the service of a non-performing vendor, and to select a new vendor. So keep an open mind. You never know, you might be able to solve the problems with the current vendor.

Those are the kinds of steps you have to go through, in terms of upgrading. I was impressed in listening to Maureen Killeen and to David Silcox by

the complexity of defining the functionality and making the business case. Obviously, you are going to have to have systems that deal increasingly with multimedia, with CD-ROM and technologies like that. So, just defining the functionality you are going to need for the next four or five years is a real challenge.

You have to follow a fairly formal process because you want to get a contract with the vendor and put some claws into the relationship with the vendor. In other words there should be, as you will see later on, penalties for non-performance and so on. When you're going through this process, you're not only picking a vendor, you're structuring your relationship with that vendor.

Another suggestion is to draw the board members in early, co-opt them into the process. It's harder for them to wriggle away on you later if they've been party to the decision-making process. At least, I think it makes it harder for them. I think we have one or two here, so maybe later we can ask for comments about when they want to get involved in this process. They may say never.

The other thing I'd suggest is to involve city hall early on. I know that a lot of library boards are relatively autonomous from city council and from its finance function, but I'd suggest you involve municipal people (councillors and the municipal staff) early, on library committees, discussing system upgrades or replacements.

I think if you do your homework on these sorts of things, think through these structures early on, you can save yourself an awful pile of grief and facilitate the process of selling the results to the people whose support you need.

How many libraries have all of the next three: data processing, management expertise, technical expertise to evaluate the vendors, to define requirements and so on; telecommunications technology to define the networking requirements for the proposal? You may have to consider hiring somebody from the outside.

In order to control the process, and the chief librarian and the board of trustees should control the process, you have to get the right resources in at the right time and only at the right time. Most importantly, you have to plan. The plan should have some tasks, the tasks should be scheduled and their purpose defined so that there is some structure against which to measure progress. You can't hit a target unless you know what it is and where to aim.

And now for the finale, picking the right vendor. When you make a commitment for a library system, you are making a massive commitment. You are not only playing "I bet my career," you're playing "I bet the library." You're spending a lot of money and once you're down the road a piece with that vendor, it's really hard to get out. It costs a lot of money to extricate yourself from one vendor and move over to another vendor. You want to spend a lot of time agonizing over the selection of the vendor. It's critically important.

In addition, I'd suggest you kick the tires, but don't do it at your own vendor's site. Kick the tires at a comparable institution even if that means you have to go to San Diego or London, or somewhere even further away so that you can see the vendor's system in an operating environment. Not only do you see the system working, you gain access to

people in that library and you can ask them what they really think of the system.

The last point: even in your worst nightmare don't dream about writing your own software—absolutely forget it. It's easily the single most difficult task in computers today, something nobody does very well not even the vendors. They have a lot of trouble bringing these products to market. Don't try to replicate what they are doing. There's a lot of good stuff out there. The trick is to find it.

You also have to have fairly realistic expectations. In one instance, I was called in by someone who wanted to use me as a Doberman pinscher to make his vendor perform, and when I got there I found out this guy was making totally unrealistic demands. I was about to say it another way. He was loony. Nobody could have made the vendor do what the client wanted done because the client didn't understand enough about computers to have a realistic set of demands.

You also need to internalize some skills. You have to control the vendor. If you don't tell the vendor to jump two feet three inches high, chances are he won't hit that height. So you have to control him, and by control, I mean tell him clearly and precisely what you want him to do. If you don't control him, you're really just saying let's sign some kind of fuzzy contract, we'll press go, sign a cheque, jump clear and hope it all works out. I can guarantee it won't.

Write a good contract. You need very tight specifications on the performance of the software, performance of the hardware, and performance of the vendor. You should consider staging payments as part of the discipline in the process. Make progress payments. Tie the vendor to clearly defined, specific delivery dates. When you first approach the vendor on this he'll say, no, you can't do that. Even the process of arguing about specifics clarifies them in everybody's mind. So I think it's a useful dialogue to engage in with any vendor.

Also, consider a fifteen per cent holdback until you are totally satisfied with the system. If necessary throw that into escrow with the lawyer with the release conditions defined and so on and so forth. There are ways and means to put teeth and claws into any contract.

You also have to invest in the relationship, and by this I mean spend a lot of time with the vendor. Spend a lot of time with your systems people learning about different kinds of systems and how they work and how they don't work and all the rest of it. As chief librarians and trustees you must invest in that relationship, because if you don't, you'll feel awkward about it and you won't fully understand what you're trying to manage and control.

Nine times out of ten when we're called in, there's been a failure to communicate. That may be a well-founded failure to communicate, but we spend an awful lot of time arbitrating between vendors and clients, so my advice is to communicate. It's part of investing in the relationship. If you're not happy, tell him.

Lastly, and I don't mean to be sacrilegious, but I mean it in a very religious sense, pray. Computers are still a very risky business and even if you've got everything lined up correctly, something crazy could happen. You might be going,

for example, with a very, very solid vendor who suddenly goes bankrupt. It can happen. In terms of justifying it and making a good business case these are the kinds of issues that come to mind.

Typically, benefits that we see accruing to libraries are things such as better management, better use of the collection, and better access to it. As the preceding speakers have said, the nature of that collection is going to change dramatically over the next ten years. So the systems have to be even more flexible in terms of their functionality.

The last point I think is very important. You have to be able to speak to councillors. You have to be able to speak to senior management and to the chief financial officer of the municipality in English. Libraryese, and I know you're not guilty of that, and computerese, and I know I am guilty of that, won't do. They don't understand it, they don't want to understand it, they can't understand it. So you have to put your reports in good old plain English and if you work at it, it can be done.

If the chief financial officer of any municipality is doing his job, he has a very tight relationship with the mayor. I know that's the case in every municipality that I have dealt with so far. If he doesn't, his job is usually threatened. So I think you want to try and co-opt him fairly early into the process. Get him involved, go over and talk to him about what type of report he thinks might make sense for council, talk to him about the rough ballpark number. If he throws a fit in the corner of his office about the numbers, then you know you've got to rethink your tactics and strategy. So, you've got to get some early response and early reaction from the chief financial officer and that's why you take, say, a draft report over and review it with him and look for reaction and guidance.

If your municipality has been limited to a four per cent raise in taxes, I'd suggest you re-think your request for five million dollars for capital funds unless you can think of some other source. You have to be prepared with fallback options. Maybe what you do is have several staging plans where you say, "Look, if you want to swallow it all in one bite, it's a seven million dollar lump and here's what it looks like. If that's indigestible then here's a three million dollar lump followed by whatever."

I repeat, you have to have fallback options. I mean you have to be reasonable and practical. You can't go to council asking for eight million dollars when they have just had a massive strike.

To summarize, get a system strategy in place—what applications, what architectures, what you want to do with this thing—because if you don't know what you want to do with it, the odds are you won't get it done. Get the process structured along the lines that I mentioned earlier and stick to the structure. Make it work. Get the right resources involved. In particular, get senior management councillors and financial people involved early. And this may sound commercial, but get the right sort of specialist skills either on staff or from the outside. Most importantly, accept your managerial responsibility to control, manage, and direct the vendor. He's not going to manage himself on your behalf, so you have to do it, and you people are the ones who have to make sure it happens.

I think you need to get to the position where you are as comfortable managing information as you are managing people and money. It's simply that important. You can't run a library without them nowadays. You're stuck with computers and telecommunications, so you might as well dive in and enjoy it. It's fun.

And my last point was made earlier. I'll just mention it again, because of the pace of change in technology, you're going to go through all this fun every five to seven years.

MAKING THE CASE IN THE POLITICAL ARENA

Jean Orpwood, Director and Morris Zbar, Chairman, North York Public Library; Jim McGuffin, Alderman, City of North York

North York was the first large public library in Canada to move to a second generation circulation/collection management system and to request funding from municipal council for the project. The three panelists will discuss their roles in the review and approval process, the Board's and City Council's initial reactions to the fact that an upgrade was required, how the issue was resolved, and what was learned from the process.

Jean Orpwood

First, I would like to thank Wayne Peters very much for his very thorough presentation on the process of replacing and updating computer systems. Actually, as I was listening to him speak, I thought, "He has described the North York experience; this is case history number one." And particularly when he said, "Job on the line," believe me, there is no question that credibility is a big issue.

Although I'm not a mother myself, I have to tell you, as the Director of North York Public Library, I felt very much the way mothers must feel when their teenagers go off and do dumb things. They ask themselves, "Where did I go wrong?" That's the feeling I had. I thought we had it in hand, I thought it was under control, I thought we knew the system, I thought we knew the vendor: what ever happened?

I think the first thing I would like to encourage you to remember is that everybody underestimates. Underestimation was the first label that we placed on our situation. We advanced into technology and computerization through cataloguing. But our major bang was when we decided to do circulation and possibly, an on-line public access catalogue.

For anyone who has not been into first generation automation, switching from manual to computer is a major switch. In my experience, moving from one type of software system and hardware to another is relatively easy.

To use the mother metaphor again, I'd say the process is like having a second child. The first child is a really new experience, but when the second comes, at least you know what motherhood is going to be like. When the second child is five years old, you'll be ready for a third and you will have a little balance. I think that's the way I'm going to approach our next generation of computers.

The essential problem, in my estimation, is gaining an understanding of what it is you're facing: identifying the problem. Sometimes there is so much detail that it's hard to pull away and really get the problem identified clearly. There's another major area that has to do with educating yourself, the staff, the board, and council.

One thing I would emphasize

is that there is nothing quite as welcome as a second, outside, objective opinion. It's something that's used in medicine all the time. That's not to say that North York Public Library was sick. North York Public Library was going through an enormous growth spurt: a new library that was going to be four times the existing one was a major element in that growth.

We knew that we'd have a lot of new staff. We knew that our old system could not handle a new library of that magnitude. We knew that we had to have a new organization. We knew that all of this was going to cost multi-bucks.

One point I would make is this: try to avoid approaching a computerization project, of any sort, out of context. Computerization must be seen in the context of the whole library and in the context of the community that you are trying to serve. It's ludicrous to find yourself promoting the acquisition of a high-powered car when you're working in a community with severe financial difficulties.

The best thing to do is to stay with your community. Accept that you have to be a leader. Librarians should be leaders, I don't care at what level. You must describe what it is you're trying to do, why you think this particular approach is best, what it is going to cost, and what the user of the library will gain from the process.

You should certainly allow your creative juices to run freely. Don't take a single path approach to any problem, certainly not a technological development that you are trying to get going. Remember too, that the librarian has a role as an educator, and certainly a director is high on that education plane. There's no question in my mind that education starts with me.

I am not a "techie." I don't get hooked on technological terms. I admire people who master the details of technology, and I admire chief librarians and directors who master that. However, personally I would be wary of becoming a highly-advanced technology expert. I believe my role is to have an understanding of it and to understand how it can be used to produce the kind of service we think is suitable for our community.

Having gained that understanding, I believe it's the director's responsibility to educate the board. I believe it's the responsibility of the director to educate city officials, and by that I don't just mean the financial fellows. There are those who are competing for dollars as well, there are others there who are going to be jealous if the library gets too many bucks or goes too fast. Remember, you're one of many trying to make a pitch.

I am a very firm believer in hiring outside consultants. I get razzed about it at the board. When I bring forward a proposal to hire a consultant, I try very hard to present the argument that because we are inside dealing with the problem specifically every day, we see our plan only from our point of view. To my mind an outside opinion often can cut through some levels which cause trouble for boards and for council.

I want to refer quickly to the notion that Wayne Peters put forward, to get to the financial officer in the city early. Praise be! It's the best thing you can do. Everyone should understand, but especially the fellow who is indeed,

frequently very close to the mayor. He must understand why you're going the way you're going, what the timing is, what the alternatives are, and the stepback or phased ideas that you have.

I have to tell you also that I know if I do not work actively at keeping that relationship going, there are many, many others who can draw that man's attention away from the library. It's like everything else; once you start, don't drop the ball. Keep going. That doesn't mean you phone every day. As you proceed through, make sure that that one city official, at least, understands.

In North York we knew our old system was not going to be big enough to take on the new central library we were planning, let alone bring all of our libraries on-stream. We knew we were going to have to increase our organization staff size, and that we were facing major budget increases. So in going to the city and making our pitch for the last four years, we kept saying it's coming, it's coming; remember now, it's coming.

However, even with all of that warning, the news finally sunk in in January, 1986, when somebody said, "Oh my God, you mean it's coming?" And we said it's coming. And because city council also wanted somebody else's opinion other than the library board's and library staff's, they opted for hiring another management consultant-Towers, Perrin, Forster and Crosby. The first task for that management consultant was to review the whole process we had undertaken about our computerization upgrading. Get it? Not a replacement, upgraing.

Because we had some severe time constraints, the Towers, Perrin, Forster and Crosby people agreed that they would take that part of our development plan as the first item in the process. I had some sympathy for the difficulties they faced because of my own opinion that technology does not exist on its own. It's part of the total, it's part of the whole library, it does things for the library. So, for a management consultant to say, "Yes, we agree, we'll do this project first," I think was quite a risk on their part.

Needless to say, there were some nervous moments when yet another review of the process was to be undertaken, and by people who did not know the North York Public Library system as well as the Woods Gordon team now knew it. It was undertaken by them with a considerable amount of energy. They were certainly very determined to uncover every single rock. Thank God we didn't have too many worms crawling around underneath.

This is a happy ending, this is Hollywood. They came forward and indeed, confirmed that the vendor choice that had been made by a combined team of staff, Woods Gordon consultants and the board, was the best vendor for North York. That was a major breakthrough for us. We've been working on that ever since.

The other insight I gained, and I note that I'm supposed to tell you what I learned from the process, is run like hell. No, I don't mean that. I think the important thing is to give people time to master the complexities. And that isn't just everybody else, give yourself time to master the complexities. Don't assume that you can visit a meeting for two days and you've got it. It doesn't happen that way. You must understand what it is that you want to do, what's the

best way to get there, and what are the alternatives if you can't go down the path you think is best.

It's always nice to say, "I know exactly where I'm going and I'm going to get there by doing A, B, C and D." I would suggest that most people in this room who run library systems know that A, B, C and D is fine, but you better have X, Y, Z and two or three other paths available. It's not just stepback position, it's step aside, move forward on something else, come back to the original, pick up a piece. It's melding from alternatives. It would be so wonderful to be able to say, "I've got it all here and away we go."

The time that a board needs to understand complexities isn't any longer than it takes you. Given that they are not with the situation and the operation every day, they have an even more difficult task to understand why you want to do what you are proposing. Questions arise: "Why would we ever do it? Why does it cost so much damned money? Isn't there another way to do it?" You must give time. You must have patience.

Librarians are supposed to be in the information business. I think you can't do anything better than remember that you're trying to provide information, so give it at the level which is going to be understood by that particular audience.

Morris Zbar

The question I would like to address is how does a lay board make the decision to upgrade or replace a computer system. I'd like to cover some of the technical, financial and political implications in my brief presentation.

The first thing is that one never speaks of "replacing" a computer system. If you try and go to the municipal politicians and tell them that you want to replace the three or four million dollar system that you put into place several years back, the reception will not be very positive. So the word "replace" is not in our vocabulary. The word "obsolete" is not part of our vocabulary, either.

We talk about "upgrading", we talk about "expanding the system", we do a variety of things, but we never use those two terms I mentioned. Thus I won't mention them again.

Basically, there are seven steps involved in computer upgrading.

The first is problem definition. Wayne Peters spoke about this and I'd like to refer to a number of the things he mentioned. He talked about initial underestimation of load and cost. We did that. Slow response time. It wasn't too bad, people could go out for a meal and come back and they'd still need an answer. The need for increased, improved functionality, sure. Poor vendor responsiveness.

Those are the issues, but what is the problem? How is the problem defined? Well, the problem is defined by three distinct client groups. The first is the user, of course. On the board, you hear complaints from the patrons who go

into the library and see people standing in line. "What is all this computer stuff when it's taking us longer to get a book out now than it did before?" they ask. So the user is the first source in terms of defining the problem.

The second is the staff. The staff get very frustrated. They're very concerned and they're trying to provide an efficient, effective service. They've been promised that computers will do this for them and yet, look what's happened. So staff become very frustrated.

Administration, of course, is the next. They're always the last, but they're the next. When the chief or director wrings her hands at board meetings and says, "We have a problem," then the board really realizes that we do have a problem. So that's the problem defined.

What do we do next? Well of course, no one admits to total failure. So you look for stop-gap solutions. So that's the next stage of the process. We come up with a number of panaceas, each of which we hope will solve the problem. The first is, finding an appropriate software package that will solve all our problems. We run around looking for that package, we buy several, try them and we still have the problem. Then we decide it's a hardware problem, so we try add-ons. We look at putting computers on top of each other. I won't use technical jargon, but I think you know what I'm alluding to. That doesn't work.

Then we say, well maybe if we move them, place them in different configurations, maybe that will work. So we move things around and we put them at 90-degree angles to each other, that kind of thing. It looks good, but we have to accept the fact that we need change and we need a complete computer operation overhaul. And that's a difficult realization for boards to come to because we have to accept responsibility for the previous decision; and I think I'm glad it's been stated several times, that computer upgrades should occur every five to seven years.

Boards, initially, and politicians, certainly, have never accepted that fact. When we look at computers, or when we look at computer systems and we look at the major capital investments required, we felt initially, as do the politicians currently, that this is a lifetime commitment. That once you commit to a system, that's it and if you need an upgrade or a change, there was a failure, there was an error in the first place. The board was very hesitant about proceeding because again, it reflected on our initial choice.

Obviously, as we become more experienced in the use of computers, we realize they are like any other capital item. We have to look at depreciation, we have to look at changes over the years.

When we buy bookmobiles, when we build buildings, we know that they have a limited lifespan, we know that we're going to require upgrades, we're going to require changes, we're going to have to trade in the bookmobile and buy a new truck. The same thing applies to computer systems. We have to educate everyone to that knowledge because once you accept that, then you can move on. And as I've said, that's a difficult process both for boards and for political leaders.

The next step then, once we have that acceptance, is determining need. A board determines need, through the senior staff. And again, I can only echo

the comments Wayne Peters made about using the English language. When we get reports that use computerese and libraryese, it makes it very difficult for us to come up with positions that are sensible.

So I urge you to use a simple approach. Simple in the sense that what you're trying to do is communicate a problem and reach a solution. And if people can't understand the communication, then you've failed. So remember the audience you are addressing.

We board members have various expertise. A number of us are involved in business, others are involved in government. Some may even be involved in computers, but most of us aren't. So you have to make sure that we understand in our language what the problems and possible solutions are.

Once that has been accomplished at the board level, the stage has to be set politically. It's critical to involve the politicians at the earliest possible stage given the fact that over the last decade we've been in a period of constraint where four per cent represents an annual budget increase. It's important to prepare municipal politicians for any major expenditures that will arise.

Planning is important and so is communications. It is essential to develop mid- and long-term planning processes in the library, dealing with computers and other issues as well, so that these can be communicated to the city in terms of capital funding requirements, in terms of increases in operating costs. So it's important to set the stage politically.

You can't surprise city hall and tell them at budget negotiation time that, "Oh, by the way, we're throwing in a new computer system for five million dollars this year." It just won't wash. You have to prepare them and that can take several years. So this is a staged process; it's one that requires planning and one that requires a lot of thought.

Once that's been done and the commitment has been given both by the board and the city, choosing the right system becomes a key issue. The first issue is understanding the requirements. And again, I must reiterate the need for you people to explain your requirements to your boards, in the short term, the intermediate term and also the long term. And again I think it's important to make people realize that we're talking about a five to seven year cycle: by the end of that cycle or in the middle of that cycle, we have to begin planning for the next cycle.

Make sure that everybody understands that. Make sure that there are no recriminations later when you talk about upgrading a system, because then your job really is on the line because people aren't prepared to accept that. I think that's the most difficult thing and I harp on it. Getting people to recognize the fact that there has to be an upgrade strategy in your planning process is absolutely essential. Once you get into computers, into the use of technology, and you get on that merry-go-round, you're going to stay on that merry-go-round.

Once you've understood the requirements, it's important that when requests for proposals are being developed, we (the board) understand as best we can (and I think we do very well), the technical details involved. It's important that the board has input in the request for proposal and that the board is involved in looking at the responses to

those R.F.P.s.

When all of that is done, I think the kicking-the-tire issue is an important one. We sent our staff to San Diego, California. Several of our board members ended up in Cleveland somehow. I still don't know how that happened, because there were comparable systems in California and Cleveland. The staff went to California and we went to Cleveland. The next time around, we're going to reverse that.

But I think it's important and I don't begrudge the staff a pleasant trip. I think it's important that you do kick the tires, that you do see the system working in a comparable-size library system. You're investing millions of dollars, more importantly you're investing incredible amounts of staff time and board time, and it's important that you know what you're getting. So I would urge you to make the initial investment and make sure you visit as many sites as possible, and make sure that you know what you're getting.

Getting the bucks...You've got the system, now you need the bucks to pay for it. Again, involving the politicians at the earliest stage and developing an ongoing relationship with city hall is vital. I think, you know, if we can speak frankly – I'm sure we can, I know you all, we're all friends – many of you feel that boards and board members are a pain in the butt and give you a hard time and aren't very useful, a bunch of lay people messing around with your areas of expertise.

That may be true in some cases, but when it comes to dealing with politicians and the city, I would strongly urge you to consider the fact that many board members are very active in their communities, have good political instincts and close contacts with municipal politicians. They can be your strongest allies-should be your strongest allies– because they represent you in getting the kinds of resources you need for the library.

It's important to lay the groundwork, as I've suggested before. It's important for board members to make the case to the mayor, to the board of control, to the local politicians because if that is done, then resources are available or can be made available. We've been very fortunate in North York. We've received excellent co-operation from the city in terms of funding.

The point I'm trying to make is that libraries require a massive investment from the city. And because we have worked very closely with the city in this project over the last five years and prepared them for the kinds of dollars that are required, we've done very well, thank you very much, and we're very grateful. It did involve a lot of work and I would suggest that your board be used that way.

The last phase is implementation and again, implementation is a very technical aspect. It involves library staff, it involves the vendor, it involves the consultant. It also involves the Board. The Board should be apprised regularly of what the implementation issues are, what the glitches are. Because no matter how good your system is, no matter that you've made the right choice and I hope you all do, there will be some initial problems and there will be some initial setbacks. It's important that the board be made aware of these and not be surprised later on. So I would urge you to involve us in the implementation process.

Six months after the implementation process when everything presumably is running smoothly, it's time to begin to think about the next cycle. Unfortunately, there's no rest. You have to begin, and I say this having thought it out, because being the Chairman of the Board and being a board member, I'm very fiscally responsible. But I think it's important to begin the planning cycle for the next stage, so that halfway through the cycle, the three-year point or so, you're ready to develop specific proposals for the next time around. So I urge you to do that.

Jim McGuffin

Let me tell you about my small part in North York Public Library's progress towards its new computer. In 1984, I had the privilege to be appointed as the mayor's representative to the North York Public Library Board. At that time, Bill 93 had not been enacted and there was still only one council member on the library board. I was that person.

I did not know to what I had committed myself. Despite some thirty years as a user of the North York Public Library, I retained an impression that all library activities would be conducted in a manner consistent with the ambience of a library reading room: quiet, laidback and something less than onerous. How wrong I was!

I found myself enmeshed in one of the most active and burdensome of my council responsibilities. Our library board, I guess like many others, is a mini-council all of its own with lengthy agenda, its own political environment, a number of committee responsibilities, and an awesome range of technical and administrative detail to absorb.

In the course of these activities, the board was introduced to and briefed on the intricacies, expectations and indeed, the deficiencies of our computer system. Prior to my arrival, the library board had obtained approval in 1981 for the installation of the Universal Library System, an automated circulation system, which also provided some minimal cataloguing capability. One of our largest and busiest branches, the Fairview area branch, went on-line in 1982.

The introduction of the computer

system had cost the City of North York some one and one-half million dollars spread over several years. About the time of my appointment to the board, it had become apparent that the PDP 1170 equipment and the Ulisys had insufficient capacity to meet the library's longer term objectives. Seven branches were unable to go on-line, including our central library branch.

To complicate matters further, the non-standard cataloguing facility inherent in the Ulisys created problems with other Metro systems. This situation presented a dilemma to the board and senior administrative staff and after some lengthy deliberations, Woods Gordon was retained to conduct an assessment of the short, mid- and long-term needs of the North York Public Library and to identify software and hardware alternatives to meet those needs.

The North York Public Library Board received the consultant's report which recommended replacement of the present system because of its inability to service the library system. Some of this is a duplication of what you have heard already, but it will help to reinforce the sequence of it, if you don't mind. While obviously this created financial difficulties, needless to say, it also created political issues.

In early 1985, The Woods Gordon consultants prepared a request for proposal. When the Board's recommendations, based on the consultants' study, were forwarded to the City Controller responsible for reviewing the library budget, the request for three and one-half million dollars for computer expenditures after the one and one-half million dollar computer purchase just four years earlier, raised some justifiable questions.

To back up a little, you should know, you've heard it several times today, that coincident with and parallel to all of the foregoing, in 1982 the City of North York had approved plans for a new central library to replace the outdated Gladys Allison Central Library facility. The twenty million dollar, seven storey, atrium style, 160,000-square-foot building designed by Raymond Moriyama had been given to the City and the library board as part of a long-term land transfer agreement by the developer who won the proposal competition.

Notwithstanding the method by which the new central library building was achieved, it has generated several million dollars in capital costs to the City's budgets and indeed, in operating budgets as well to furnish, equip, stock and staff the new facility. Thus, the new computer recommendations added to the substantial start-up expenditures already committed by the City, and coming as they did in an election year, generated calls for further review of the whole proposal.

The North York Public Library Board and senior staff are held in high regard by the council, which has consistently and substantially supported the library system. In 1959, I think the budget was some $250,000. In the current year, approximately ninety per cent of the library costs are being funded by the City of North York and it's to the tune of twenty-two million dollars.

Despite the support for the library, the high computer financing costs were just not understood. The reputation of Woods Gordon, and specifically the expertise of consultant Wayne Peters, carried some weight. And while

Peters, carried some weight. And while the needs set out in their report were recognized, the timing of implementation was a matter of financial and political concern.

The Library Board, commencing in 1985, ultimately carried out its own extensive management review in preparation for the move in early 1987 to the new central library. That review set out in some considerable detail, the projected staffing and system requirements.

In view of the political sensitivity, the Mayor suggested at a meeting in 1985 with the Library Board Chairman, the Director and myself, that the City should require the library to undergo a management review by a consultant to be retained by the City to verify the staffing requirements for the new library and, specifically, to review the implementation of the new computer recommendations.

Because of the extensive management review which had already been completed by the library, we were somewhat reluctant, but stressing the need for haste in the project we agreed to that course of action. In January, 1986, Towers, Perrin, Forster and Crosby were retained by the City to review the library. It was politically expedient to do so.

In March, the consultants' report was tabled before council with some recommended changes, but generally it strongly endorsed the library management and systems. In April, the council approved the capital funding for the new automated system and in September 1986, the North York Public Library Board signed the contract with Data Research Association for the new system.

That's the end of the story, I guess, except that out of it all I think there are a number of political considerations that have to be given attention. Many of them have been touched on this morning, but I do want to mention some things because I think they're important in the overall consideration.

I can't stress too strongly the need for studies by respected consultants to substantiate major expenditures for computer systems. As other people have said, the off-property expertise and support that you get from those people is very valuable.

As Wayne Peters has said, the necessity of including a periodic computer update review, approximately every five years, is something that should be clearly understood by all concerned. This indeed, was not understood by some members of the council and I think, by some members of the library board.

We are living in an age of rapidly changing technology. The better informed people are, the better they will understand the need. Furthermore, in an age of rapid change, the opportunity for expanded utilization of the system can quickly overload its capacity, and that's been said by other people more clearly than I can say it.

I want to stress the need for a close relationship between the library board and the council. People talked about speaking English. I think also you must remember that everything seems to be accelerating these days and the volume of paper that crosses a councillor's desk in a day is phenomenal. There are committee reports and reams of material, as probably many of you know. Brief reports and reports that are written in clearly understood English are essential.

Furthermore, the need for a close relationship is important because of the competition for the tax dollars today. The competition is keen. Councils are trying to keep their budgets down to four per cent and that increases the competition for tax dollars. The better you state your case, the better and more likely you are to achieve your ends.

I think the changes in the constitution of library boards under Bill 93 provide an opportunity for more members of council to serve on library boards and thus with adequate coaching and education there will be additional supporters when library issues come before council.

PUBLIC ACCESS TO ELECTRONIC INFORMATION: THE EXTENDED OPAC AND ONE-STOP SHOPPING

Charles R. Hildreth, READ Ltd.

Charles Hildreth is the Chief Consulting Scientist for READ Ltd., an international consulting and planning service for library operations and information systems. A librarian by training, Mr. Hildreth has lectured extensively about on-line public access catalogues and standards for information retrieval systems and his publications include "Beyond Boolean: Designing the Next Generation of Online Catalogues."

Improving Today's OPACs: the "Extended OPAC"

Theoretical discussions of the proper content, structure, form, and function of the library catalog typically salute Cutter's objectives, thereby recognizing these objectives as foundational, first principles of the library catalog. It is always useful in discussions such as these to review Cutter's classic requirements for the catalog. A proper library catalog must:

1. enable a person to find a book of which either the author, or the title, or the subject is known;

2. show what the library has by a given author, or on a given subject, or in a given kind of literature;

3. assist in the choice of a book, as to its edition, or as to its character (literary or topical).

While it is true that most 20th century library catalogs which incorporate Cutter's principles are largely monograph-oriented and provide no access to the periodical literature, Cutter's requirements, when fully understood, are a good place to start in achieving a good library catalog. However if we are to provide a full-collection online library catalog, we must advance beyond the Cutter catalog. This can be accomplished without diluting or sacrificing Cutter's ideal. These first-generation OPACs could be fast "known-item" look-up mechanisms when presented with precise author, title, or control number information, but they lacked the syndetic structure, linking references, and logical file organization necessary to function as a Cutter catalog.

In any area of science there is always some distance between theory and practice, some gap between institutionalized ideals (the conventional wisdom?) and actual accomplishments. In the past the available technologies of the library catalog accounted for the lag between actual library catalogs and the science and theory of the library catalog. Book, card, and microform catalog media were *constraining* technologies. Each had its inherent limitations, well known to every library science student who has had to learn the litany of the advantages and disadvantages of each "form" of the catalog. Ironically, the very existence of these early technology-based physical limitations has too often had a constraining influence on theory. More specifically, the old forms of the library catalog have limited how we dare to think about the potential of the library catalog as it may exist in an unconstrained physical environment.

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As we have passed irreversibly into the online access era with its wide availability of machine-readable bibliographic records for most items in any library's collection, we are witnessing something of a scientific revolution in our arena. Library catalogs in operation no longer have to fall short of the ideal because of the dead weight (maintenance) and costs associated with outmoded catalog technologies. In fact, the practice if developing, introducing, and extending the resources and capabilities of the online library catalog in our libraries and library consortia is outpacing academic speculation and theoretical discussions about what constitutes the "proper" library catalog. The technology of the online public access catalog has unleashed our imaginations and has created an avalanche of possibilities for improving library catalog-based services. With a quickening pace, librarians are exploiting these possibilities to provide both deeper and more comprehensive access to the information and materials in their collections.

It is no longer fashionable to view the online catalog as merely a new form of the traditional library catalog, that is, as a sort of mechanized card catalog. Such a view represents a backward, unimaginative perspective. The best of today's online catalogs have transcended the limitations of the earlier forms of the library catalog (i.e., book, card, and microform). The unique characteristics of the online catalog account for this quantum leap forward: it is an interactive medium, it is infinitely expandable in function and content, and it is a public, self-revealing, self-tracking access instrument.

All of this makes it very difficult to define the ideal library catalog in the traditional manner, an approach which poses a theoretical construct imbued with the appropriate principles: the result being an ideal which actual catalogs should measure up to, and could if only the costs were not prohibitive. Accordingly, I will not attempt a definition of the "extended OPAC." I do wish to point out that "extended" means, among other things, to enlarge the scope of, to make more comprehensive or inclusive, and, to cause to move at a full gallop.

Figure 1. lists eight ways the conventional library catalog is being extended in a variety of online manifestations in our libraries. Most of these extensions involve adding data to the MARC catalog records, integrating related data files such as customized periodical

Figure 1. The Extended OPAC

1. Functional Search and Retrieval Enhancements

2. MARC-PLUS Augumented Catalog Records (subject descriptors, headings from tables of contents, classification vocabulary)

3. Integration of Local Non-MARC and Pseudo-MARC Bibliographic Records (non-standard records and subject pathfinders, abstracts, book reviews, and research guides)

4. Advanced Database Syndetic Structure (defining customized sub-catalogs and subject-based trails and pathways)

5. Additional Self-Service Convenience Funcitons (self-charging, online ILL or reference service requests)

6. Locally Created and Maintained Information Files

7. Remotely Published, Locally Stored and Accessed Information Files

8. Gateway Access to External Bibliographic and Information Fiels (online reference databases, other OPACs, and electronic union catalogs)

indexes into the monograph catalog, or adding reference information files to the overall OPAC database some of these extensions to the traditional catalog, I wish to review the success and shortcomings of today's "second-generation" catalogs.

Second Generation OPACs: Features and Functions

Most university-based OPACs in North America and many OPACs supplied by the commercial vendors can be characterized as second-generation OPACs (See Figure 2.). These second-generation

Figure 2. 2nd Generation OPAC Advances

Subject Access via Library of Congress Headings

Keyword Access ot a variety of Fields

Browsing Index or Thesaurus Terms (With Cross References)

Interactive Search Reefinement (Boolean Logic, Limiteing, Etc.)

Search Term Approximate Matching (Trruncation, Wildcards)

Shelf List Scanning

Two or More Dialogue Modes (Menu, Command, Conversational)

Informative Error Messages

Directory-Based Help Facility

Automatic Search/Display Option Suggestions

Full Bibliographic Records Accessible

Multiple Display Format Options (Inc. Non-MARC Lables)

Search Results Output Options (Save, Printing, Sorting)

OPACs with their MARC catalog record databases can be viewed from a functional perspective as special purpose online reference retrieval systems.

In first-generation catalogs, searching was initiated by derived-key input or by exact term or phrase-matching on at least the first part of the term or phrase (as with heading searches in the card catalog.) In addition to lacking subject access, including any keyword access to titles and subject headings, first-generation online catalogs provided only a single display format, a single mode of interaction with the system, and little or nothing in the way of online user assistance. Refining and improving a search in progress, based on an evaluation of intermediate results, was out of the question. Without subject access, authority-based searching with cross references, and meaningful browsing facilities, first-generation online catalogs were understandably criticized as inferior to traditional library catalogs.

Today's second-generation online catalogs represent a marriage of the library catalog and conventional online information retrieval (IR) systems familiar to librarians who search online abstracting and indexing databases via DIALOG, BRS, DATASTAR, MEDLINE, etc. Improved card catalog-like searching and browsing (via headings and cross references) capabilities have been joined with the conventional IR keyword and Boolean searching approaches. Many online catalogs support the ability to restrict searches to specified record fields, to perform character-masking and/or righthand truncation, and to limit the results by date, language, place of publication, etc. Also, bibliographic records may be viewed and printed in a number of different display formats.

Second-generation online catalogs should be viewed as bibliographic infor-

mation retrieval systems. But when compared to their conventional IR forebearers, these key differences should be kept in mind:

* the online public access catalog must be usable directly by untrained an inexperienced users (online assistance is usually provided to help with the mechanics of searching),

* records in the catalog database lack abstracts, the subject indexing is sparse and uses broad terms not representative of current terminology, and

* the catalog database, in covering a library's collection, includes information on a wide variety of disciplines and subject areas.

Designers of second-generation online catalogs have addressed these differences in two ways: by providing card catalog-like precoordinated phrase searching and browsing options (along with keyword/Boolean capabilities), and by providing more and more online user assistance in the form of menus, help displays, suggestive prompts, and informative error messages. On the other hand, post-coordinated keyword searching on subject-rich fields (e.g., titles, corporate names, series entries, notes, and subject headings) serves to alleviate the twin problems associated with the sparse subject indexing of most library materials by the Library of Congress (using its list of subject headings - "LCSH") and the users' unfamiliarity with the controlled indexing vocabulary.

A library catalog that fulfills Cutter's classic objectives for the catalog in the online environment is a significant accomplishment. it succeeds in at least two ways: users prefer the online catalog to either the card or the COM catalog, and the online catalog is easier to maintain and update than earlier forms. Designing a keyword/Boolean information retrieval system as an online catalog that is easier to learn and easier to use than the conventional, commercial IR systems is also a significant accomplishment. The traditional, well-structured library catalog has been joined with the power and flexibility of conventional IR systems.

Problems and Shortcomings of Today's OPACs

Second-generation online catalogs can be used effectively by library staff and by library patrons trained to use and understand their particular indexing and search idiosyncrasies. Most of these online catalogs are not yet effective, usable "self-service" information retrieval systems for a wide variety of untrained, occasional users.

Online catalog research studies have uncovered a number of common problems experienced by users of second-generation online catalogs. In general terms, the major problems include:

* too many failed searches (search attempts that are aborted, that result in no matches, or that result in unmanageably large numbers of items retrieved),

* navigational confusion and frustration for the user during the search process ("Where am I?", "What can I do now?", "How can I start over?"),

* unfamiliarity with or ignorance of the subject indexing vocabulary leading to the failure to match search terms with the system's subject vocabulary,

* misunderstanding and confusion about the fundamentally different approaches to retrieval and search methods employed in today's online catalogs (e.g., pre-coordinate phrase searching and browsing, and post-coordinate keyword/ Boolean searching), and,

* partially implemented search strategies and missed opportunities to retrieve relevant materials (e.g., searches in which large retrieval sets are not followed by searches on the call numbers of subject headings of the found records).

Conventional information retrieval systems place the burden on the user to reformulate and reenter searches until satisfactory results are obtained. This is typically the case with second-generation online catalogs, as well. This approach assumes, however, that the user knows what he wants and can describe it in the language of the catalog database being searched.

Even the best second-generation catalogs do little to help the user transform an information need to explicit descriptions of the information understandable by the system. Nor do these catalogs lead the user from "found" information to related, linked information that has not yet been discovered. It is unrealistic to expect our catalog users to know in advance the structure and language of our library databases. It is equally unrealistic to expect online catalog users to be proficient in the various search approaches and techniques before they engage an interactive system in the retrieval process. Humans find it easier to recognize things than to generate formal descriptions. OPACs could take advantage of this human facility by permitting requests such as, "Give me more like this!"

In summary, second-generation online catalogs fall short in that they:

* do not facilitate open-ended, exploratory searching by following pre-established trails and linkages between records in the database, open-ended, exploratory searching by following pre-established trails and linkages between records in the database, in order to retrieve materials related to those already found,

* do not automatically assist the user with alternative formulations of the search statement or execute alternative search methods when the initial approach fails,

* do not lead the searcher from successful free-text search terms (e.g., title words) to the corresponding subject headings or class numbers assigned to a broader range of related materials,

* do not provide sufficient information in the retrieved bibliographic records (such as tables of contents, abstracts, and book reviews) to enable the user to judge the usefulness of the documents,

* do not rank the citations in large retrieval sets in decreasing order of probable relevance or "closeness" to the user's search criteria.

Improving Today's OPACs: Semi-Automatic Search Assistance

In addition to unconventional data and file extensions to the online library catalog, as Figure 1 indicates functional and transactional performance extensions are also being made to today's second-generation OPACs. This is all to the good, because research and experience have provided us sufficient reason

not to be satisfied with the performance of today's OPACs. Reflecting on all this creative, expansive activity by OPAC designers and librarians, it is clear that in practice no pre-defined "theoretical" boundaries for the proper library catalog (regarding its form, function, or content) are being respected or observed. We are witnessing a shift in emphasis from our usual concern for bibliographic control to expanding access to all the materials and information in our collections. The promise is that that library's primary access instrument, the "catalog", will become its most used and most effective access and discovery tool.

Some online catalogs suggest either alternative search formulations or alternative search strategies for the user to try when certain "failure" conditions arise (e.g., no matches, or too many matches). This "decision-making" by the system is usually based only on the size of the retrieval results set. Other than making the suggestion, the system remains passive, taking no action. To follow the suggestion the user typically has to start a new search using the system's search protocols and new or modified search terms or operators supplied by himself. Another design approach, borrowing heavily from information retrieval system research and experiment, involves programming the system to automatically reformulate or re-execute a search in a variety of ways until satisfactory results are obtained. Usually some interaction with the user is required for eliciting judgements of appropriateness, relevancy and satisfaction (this makes it less than fully automatic). The selection of search formulations and search methods may be carried-out automatically by the system software. The user needs to know, or recognize, what he wants, but does not need to know how to search the database in an "expert" manner. For example, automatic stemming routines may be applied to search words to broaden a search. Truncating a search word to a common root may retrieve records that match any form of the search word, plural, singular, etc.

Search Statement Formulation/ Reformulation

One common form of semi-automatic assistance involves the formulation of complex keyword, Boolean search statements. In some cases the searcher does not have to select the Boolean operator(s) or enter the complete query construction. the system software does both, based on limited prior input by the searcher (e.g., selection of search type and one or more search words) and certain assumptions about the searcher's desires and needs. The Dartmouth University OPAC simply takes the searcher's words and automatically-selected indexes. A "TOPIC" from the menu and entered one or more search words. In a displayed record the Dartmouth OPAC indicates which words or phrases were responsible for the match.

A slightly different approach requires the user to select the Boolean logic to be employed with the user's search terms, and permits the user to explicitly name the parts of the record (indexes) to be searched for matches. However, the user is not required to use a complex command syntax or to know the conventional meanings (in online database searching) of the Boolean operators. The new GRC CD-ROM OPAC uses windows or boxes on the screen and prompts to elicit the user's search words and desired logic. A non-Boolean, phrase-searching interface is also offered with automatic search assistance of its own. When a

match does not occur on a user-supplied phrase, the system tries to find a "closest" or approximate match through truncated (shortened) phrases or words. Automatic cross-referencing is also supported.

Search Query Expansion Through Navigation

Most online catalogs assume that the display of a full bibliographic record represents a closure point in the search process. Online catalogs are generally inactive and silent at this point; one online catalog even displays the cryptic message, "The END". These assumptions are, of course, false. The bibliographic record contains data elements that link it with associated and possibly relevant records (authors, call number, series title, and subject headings). These linkages are not exploited in second-generation online catalogs. A single, relevant bibliographic record may serve as the "jumping-off" point for browsing a selected portion of the shelves, or it may be the point of departure for finding related materials. The user may wish to say, after viewing a bibliographic record, "Great, I want more like this." The system could then use any of several methods to retrieve related records, including gathering all records in the database assigned one or more of the same subject headings or the same class number as the initial record. With a bit more design sophistication, the system could ask the user which data element in the displayed record (e.g., personal name, series title, specific subject heading, etc.) should be used as a gateway to related records.

IME Ltd's. "TINlib" OPAC has a "navigation" feature which permits the user to point (using the cursor) to a data element in a displayed record to branch to related records linked with that term or heading. The linking relationship may be established at the time of setting up the system. It would be possible to request in this manner, for example, all books by this publisher, or all books in this series (with the cursor pointing to the series statement in a particular record. More sophisticated linkages may also be established, for instance, all books on these subjects by this publisher. That is, intelligent, precoordinated search paths may be built-in to the OPAC which can then be selected by the user who has no training in the use of command languages or combinatorial logic.

The traditional distinction between "known-item" and "subject" searches is useful for designing search dialogues. In practice, the distinction blurs, as one type of search may lead naturally into another type. A search for a specific work often becomes a search for materials related in some way to the work first sought. Transaction logs have shown the users of online catalogs frequently change from one type of search to another type during the same search session. When conducting a subject search, the user might discover a series of interest (and wish to see immediately all the titles in the series), or learn of an author who has been listed as an "added entry"" (a useless concept in the online environment), then ask to see all of this authors works in the collection. The bibliographic record as displayed can serve many related retrieval purposes. It can also be a source of relevance feedback from the user to the system. Additional dialogue and automatic search routines can assist the searcher in tracking down related materials without requiring the user to continually reformulate precise, well-structured queries until satisfactory

results are obtained.

Online catalog users display no desire to search in the disciplined, highly-structured, linear manner of trained search intermediaries who aim to produce a well-defined list of citations for an end user. The scholarly process of seeking and identifying information to assist with a problem typically follows a more circuitous, cyclical, and unstructured path of browsing and discovery. I suspect that this is also true of information seeking by the general public. We often do not know exactly what we want when we begin looking for it. The fuzzy model of information seeking activities implicit in this view should be incorporated into future online catalogs designed for scholars and general users. Efficient "known-item" and "known-subject" search methods should be retained as options for those searchers who know exactly what they are looking for.

Search Strategy Modification

Based on a view of online searching as a multi-level, trial and error process of seeking, relevance judgement, selection, and discovery, some online catalog designers have incorporated a set of search sequencing rules which, using the results of the search at given stages, determine the course of the search. The "rules" determine which search method will be executed next, based on one or more measures of success or failure, including feedback from the user (other measures include similarity of words in the query to index terms, their frequency in the database, etc.). The LCS/WLN-based online catalog at the University of Illinois takes a no-match subject heading search ("speckle interferometry") and automatically reprocesses it as a title keyword search, assuming implicit Boolean "AND"s between the search words. The retrieved citations are displayed a few at a time for relevance assessment by the subject headings assigned to the document and is encouraged to continue the search using the subject headings to retrieve related materials.

The British Library-funded experimental online catalog at the Polytechnic University of Central London, OKAPI, uses a built-in "search decision tree" approach to establish a conditional search sequence for various types of searches the user may enter (author, subject, title, etc.). The search path followed once a search begins is determined by the pre-established rule system and conditions encountered by the system in interaction with the user (e.g., user's choice of search type, user's actual query, results from a previous retrieval, the user's feedback on those results, etc.). For example, the user may enter a title phrase; the system would execute an exact phrase-match search and display any matching citations. If no exact match occurred, the system would then automatically execute a weighted, combinatorial search retrieving records which had any of the search words in their titles and displaying the citations in a ranked order with titles having the greater number of words listed first. Other optional search sequence rules that could be used following a phrase-match search include executing a word search with Boolean "AND"s, or automatically stemming some words to improve the chances of retrieving something relevant. A recent experimental version of OKAPI is testing these approaches in subject searches. This version attempts to correct some misspellings and will retrieve records which closely match the user's search words even when no "exact" match results.

These "automatic" online catalogs represent attempts to make searching easier and more effective for untrained users by automating some of the "intelligent" judgements and activities of experienced search intermediaries. These activities include relevance feedback, stemming or truncation, finding synonyms, applying Boolean operators, and ranking some index terms as more important than others. CITE, the online catalog in use at the National Library of Medicine, incorporates a number of these automatic functions, including term weighting, combinatorial searching, and ranked display output. CITE's rich dialogue also suggests limiting measures that might be applied to a search in progress, and always asks if the user would like to see items related to any displayed citation. Subject headings, call numbers, and free-text terms weighted heavily as important terms (based on an inverse document frequency measure) are used by the system at various stages of the search as "new" search words to retrieve related and potentially relevant citations.

Towards the Online Reference Workstation

Opportunities for extending the OPAC's service potential include augmented MARC records and the integration of periodical indexes into the catalog database. Several OPACs are also extending access to local reference information files and, through gateways, to remote online database search services.

The online catalog, EIS (Engineering Information System), at Purdue University's Seigesmund Engineering Library has been enhanched through the addition of data from the edited tables of contents for most of the monographs in the library's collection. This augmented monograph file is searchable by keywords, and the use of Boolean operators is supported. As new books arrive, library staff manually scan, edit, and subsequently input the tables of contents into the file. This file is very current, being updated (reloaded) weekly in the online catalog. The additional labor costs incurred by the library are believed to be more than justified by the increased search benefits to user. Both staff and patrons feel that subject searching of the monograph collection has been greatly enhanced. The number of search terms indexed per book has increased, thereby increasing the possibility of finding specific information in a particular book. Users of the Purdue online catalog are very happy with the expanded catalog because records augmented with vocabulary from the tables of contents are searchable by terms in current use in engineering. There is no need for the users to attempt matches on the generally unknown LC (Library of Congress) subject headings. Furthermore, when a bibliographic record is retrieved from the catalog, the user has the option of displaying its associated table of contents, permitting a more meaningful assessment of the potential utility of the book.

Lehigh University librarians have used "psuedo-MARK" records in their conventional GEAC OPAC to integrate online subject pathfinders (research literature guides) with the subject authority index file which can be displayed in a subject search. The subject pathfinder entry, which leads to association screens containing the research guide, may be located in the OPAC either by browsing the subject headings list or via a keyword search.

Conclusion

The fully extended OPAC, the full-collection access instrument, does not yet exist in a particular operational environment. In describing the extended OPAC, I have assumed the summative, aggregate point of view. Each enhancement or extension mentioned or illustrated can be found somewhere in one variation or another making synthesis by me an easy task. Demand, ingenuity, and the open-ended technology account for the recent rush of new access and service-oriented developments. The road to the common, everyday extended OPAC will be traveled in time, but due to technical and economic obstacles, progress will probably occur in incremental stages. Overcoming all the obstacle, progress will require considerable effort, and, in some cases, cooperation on the part of system designers, vendors, and librarians.

INFORMATION SERVICES: ON-LINE TRENDS AND ISSUES

John Helliwell, *P.C. Week*

John Helliwell has recently joined *PC Week* as a Senior Writer, following a successful five year career as a consultant and writer in Toronto. His "Personal Computing" column in *The Globe & Mail* won a U.S. Computer Press Association award, and in 1985 his book, *Inside Information*, a guide to online databases and related services, was published by New American Library.

I'm convinced that there are a lot of people out there who think they want to be end-user searchers. And I think what that means is that if I'm lucky, they are going to buy my book, *Inside Information*, which is a guide to on-line searching and on-line databases. But when they read it they're going to say, "Boy, there's lots of stuff out there, but it's far too complicated for me to do myself." What they're going to do then is come to a library and ask you to help them do the searching. So I think we're both going to end up ahead in this deal.

Now, this is the diagram that Maureen Killeen showed us earlier this morning. One of the things that you'll notice is that the computer technologies that are referred to by horizontal bars—mainframes, minis, micros, optical disc systems — don't stop. All of those lines have continued across. Mainframes are still around, micros are still around, minis are still around and optical discs are still around.

One of the points that Maureen raised at the beginning was what's next, indicated by the question marks up there. I'm going to make a quick stab at that. I think what's going to happen in those areas, at least in the first one of those question marks, is that it's not going to be another horizontal bar. I think that's where the chart is a bit off.

What's going to happen instead is the next bar is going to come up from the bottom. It's going to pull all of the other technologies together, the minicomputers, the microcomputers, the mainframe computers, optical discs. They're all going to start merging into a much more homogeneous kind of computing environment.

And in fact, I'm so wedded to that concept that I now work for a magazine devoted to the concept. It's a weekly computer industry magazine. We didn't really invent the term and not very many people like it — but it's called "Connectivity" and it's exactly what I'm talking about. It's the notion that all of these technologies are going to start to merge, that we're going to see computers talking to computers. We're going to see a lot of new things emerge, not from new lines starting, but from linking together the lines that are already there.

Now in the area of information services and how new computer technologies are going to affect information services, I think it's helpful to split the technological issues into two different collections. There are information delivery issues, the issues that have to do with getting information from here to

there, from whoever owns it now into your hands or on to your screen. And there is another set of issues which are information access issues – how to specify and find what it is that you want. If you see them as two different sets of issues, I think it makes it a little clearer and a little easier to understand how things are going to evolve.

On the information delivery side there still is and there's always going to be paper. That's still a viable information delivery technology. The other information delivery technology with which most of you are familiar and which has been around for a few years, is mainframe computer technology. That's the technology that Dialog uses and that Utlas uses.

Right now, it is mainframe computers and communications networks, sometimes based on the telephone network and sometimes based on other data communications networks, that deliver information to your desk. The existing on-line services are the obvious examples of those kinds of information delivery technologies.

One of the advantages of that kind of information delivery technology, is that it allows the data at the other end to be very up-to-date. It can be as up to date as today. *The Globe and Mail* is the very best example of that among the text databases. This morning's *Globe* is available on-line now and tomorrow morning's *Globe* will be available on-line before it actually hits the news stand.

Another advantage of this mainframe and communications delivery mechanism is that it can offer you vast amounts of data, really huge amounts of data. There are infinitely expandable databases on those mainframe computers. They're big engines and they can deal with large amounts and great varieties of information.

A third advantage of this information delivery mechanism, from the user's point of view, is that the entry cost for getting into it is very low. Once you've got a computer on your desk, the only cost for starting to use Dialog or any other information service is a relatively small up-front fee, if there's any at all. What is it, maybe thirty-five dollars to buy a Dialog manual? Something like that, it's not a whole lot more than that. Now there are obviously training costs, but I'm not talking about them. I'm talking really about the technical costs that are involved, and the entry cost into this technology is quite low.

And finally although this is more speculative and more future than present, another advantage of a communications network that links you to a central point is that besides allowing information delivery, it allows communication among the users. So we're seeing more and more marriages of electronic mail systems with information delivery services.

It also raises an interesting possibility that I don't think I've yet seen actually put together, except in some bulletin board services. The same people who use the information delivery mechanism can also contribute to the store of information at the other end, although this is only possible if you are connecting over a communications network to some central point.

There are, on the other hand, some disadvantages to the mainframe and communications network approach

to information delivery. One is that the costs of operating any service like this are based on usage; the more use is made of the service, the more somebody is going to have to pay for it.

This doesn't necessarily mean that the price to the user is necessarily going to be based on cost. There is nothing that stops the operator of a service like that from giving somebody unlimited access for a fixed price. That's a pricing issue. But there is underlying it all a cost that somebody's paying, that varies according to the amount of usage of the telecommunications lines and the mainframe computers.

The other disadvantage, the other cost associated with those mainframes and communications networks as an information delivery medium, is that there is always going to be an administrative overhead. There's always got to be a priesthood around a big computer. It's not the sort of thing that amateurs run themselves, that people muddle through on their own. It's a specialized field. It's a field in which there's always going to be a coterie of people who are in charge of the care and feeding of that central computer.

By 1987, paper and online have been joined by another information delivery technology— CD-ROM. I'm sure you're all familiar with the figures on CD-ROM. I would like to place it in the database terminology. We know it's about 550 megabytes of information on a single CD-ROM. That's about one medium-sized database on Dialog or on one of the major on-line services. It's about one-year's worth of *The Globe and Mail*. Grolier Encyclopedia occupies about a quarter of a single CD-ROM disc, so you could fit four encyclopedias on one of those discs.

One of the companies that sells CD-ROM has an exhibit that travels around to the various trade shows. They have one little CD-ROM, and they've got a box filled from top to bottom with floppy discs. I think 1,500 standard 360k floppy discs are the equivalent of a single CD-ROM.

On the other hand, the amount of information that's available on a CD-ROM is miniscule compared to what's available on a major on-line service or even on a relatively minor on-line service. The on-line services have far more information than can be delivered on a CD-ROM, and you have to keep CD-ROM's "vast" capacity in that kind of perspective.

One advantage of CD-ROM as an information delivery technology, is that compared particularly to paper, it's very compact. You get a whole lot more in a whole lot fewer cubic inches than you can with paper, or compared to mainframe computers for that matter as well. You can fit a lot of CD-ROMs in the space it takes to put in a mainframe computer.

Another advantage of CD-ROM as a delivery medium is that it makes it possible to offer better access methods. It is possible to provide more good access methods with CD-ROM than it is with on-line services. I'll get into access in a few minutes, because that is the other dimension apart from delivery.

The third major advantage of CD-ROM is that once it's bought, it stays bought. There's no meter ticking. You may have to pay again for subscriptions and updates, but your usage is not

measured and that's an incredible advantage.

If you want to put that advantage into perspective, think back about five years ago when the only way to do computing of any kind, was to hitch a dumb terminal to a mainframe time-sharing computer. And so a few people used computers, for very high-value activities. But they didn't use computers for word processing and they didn't use computers for trivial kinds of calculations. They only used computers for really important things, because there was a meter ticking in the background.

Then microcomputers came along. Microcomputers at the beginning cost quite a bit more—you could buy a lot of hours of mainframe access time for the price of a microcomputer. But microcomputers, nevertheless, took off and took hold. People liked the idea that there's no meter ticking in the background. If you really want to know what's going to happen in this fixed price versus variable price business, just ask anybody who owns shares in a time-sharing service. They probably are not nearly as happy now as they were in 1980.

Another major advantage of CD-ROM as a delivery mechanism is that it's cheap to reproduce. It costs in volume about five dollars to produce another CD-ROM disc. But again, it is intrinsic to communications lines that there is a cost that varies with usage. This fixed five dollars per disc is an intrinsic feature of CD-ROM.

But it has nothing whatsoever to do with the pricing of CD-ROM information products. The book I'm holding is a particular size and shape and costs $19.95 in Canada. You could find another book that's exactly the same size and shape, and so costs roughly the same amount to produce, but costs $700 if it contains highly specialized market research data. And heaven forbid it should happen to this book, but you may find one exactly the same size and shape on Coles' remainder counter for ninety-nine cents.

The price of the product has nothing to do with the reproduction cost. Pricing is a different mechanism altogether from the cost of production. By the way, the ERIC example that was given earlier, where Dialog has already reduced the price of the ERIC CD-ROM, is really just an example of a mistake that Dialog made by choosing for its first CD-ROM product a publicly available database like ERIC, that's very easy for other people to imitate.

Most of the current CD-ROM information products are considerably higher priced, and have held their prices, and as long as the people who are producing them own the data, they'll stay that way. There will be competition, but the five-dollar reproduction cost will have nothing to do with the actual purchase price of the database.

CD-ROM also has some disadvantages as an information delivery mechanism. One of them is that it is a fixed size. You can expand mainframe computer databases indefinitely. A single CD-ROM has a fixed size, which makes it a rather cumbersome medium for delivering any single collection of data that's bigger than that fixed size.

It also is dated. It is produced on a particular day, with data that was valid as of a particular day. As long as that data stays valid this is not a

problem. But to the extent that the data changes, CD-ROM is an inappropriate mechanism for distributing it, because you are going to require updates. It's not like periodicals which will tend to add to one another, because in most cases, the update will actually reproduce the entire database.

One example of a similar printed product is the Official Airline Guide. In most travel agencies they are stacked in a corner, and somebody has the most recent one and somebody else in another office has the next most recent one. There's a whole version control problem that's a real pain in the neck, and will be a pain with CD-ROM as well.

Another disadvantage of CD-ROM from the user's point of view is that, there's a high up-front cost, which is an important barrier to using CD-ROM. You have to buy hardware that attaches to your computer before you can use CD-ROM.

There's another intrinsic technical disadvantage that you may not have discovered or may not have noticed yet. CD-ROMs are really slow. They are not slow compared to books, but they are very slow compared to most computer technologies. They are very slow to find data, and they are very slow to transfer it once they've found it, compared to the average hard disc that's been around for quite some time and that costs a similar amount of money.

The slowness to transfer data, has in part to do with the heritage of CD-ROM. The whole technology and the reason it's cheap is because it is based on technology that was invented by Philips and Sony for delivering music. We may look at it as a way to deliver information products produced by Mr. Roget and Mr. Bartlett and Mr. Webster and Mr. Grolier, but Sony and Philips when they invented it, really had in mind a way to deliver information products produced by Tina Turner and Twisted Sister and Barry Manilow. And its speed disadvantages are the result of that heritage.

That's the discussion on information delivery media. As I said at the beginning, information access is another important issue in evolving computer technology.

I'm going to break down information access into two parts. Part of the issue is the power of the engine that is being used for searching data—the power of the software and hardware that grinds through these massive amounts of data and finds what you want. There's another part to it which is how easy is it to tell the engine what you want to do, and how attractive and how usefully presented are the results of the searching that the engine does.

Let's look for a minute at the engine for database searching, whether it's on a CD-ROM or on a mainframe computer: typically, for any serious amount of data, the engine's going to have to be more powerful than the average desktop microcomputer, especially as the volume of data goes up. That's an intrinsic limitation if you're thinking about attaching a CD-ROM drive to a single PC.

The slowness, and the need for more power in the engine, is not really a problem if you are only using your CD-ROM for an occasional synonym, or if it's being used by a single person to go through a bibliographic reference data-

base. But it is going to be a problem when microcomputers are linked into the networks.

And assuming we've got a bunch of CD-ROM databases floating around in a library, we're not going to want to have people walk up to some sort of check-out and say, "I want the CD-ROM on this," and then let them wander over to a drive and risk scratching the disc and risk damaging the equipment by sticking it in.

What we're going to want to do is to have all of those CD-ROMs permanently resident in CD drives that are somehow attached by some sort of network of microcomputers or a bunch of work stations. That requires networking technology.

But it's in that kind of an environment, where multiple work stations are trying to get at multiple drives, that the limitations of those engines and of CD-ROM technology as a searching mechanism are going to become apparent. The same kinds of bottlenecks are going to happen in that environment as used to happen when I went to the University of Toronto, and everyone in Psychology 100 had a paper due on the same day and we were all in the library stacks together. The usage patterns are going to depend on lots of things that have nothing to do with the distribution of the databases themselves.

The big mainframes, the minicomputers and increasingly the engines that are being built for handling databases on microcomputer networks remain the best kind of mechanism for heavy-duty searching of any kind of data. Here's an example that I found really interesting: The people at Lotus Development produce a CD-ROM product that contains stock prices, corporate information and stuff like that—most of it numeric information. They produce and distribute this data on CD-ROM. It's $15,000 to $20,000 a year, and you get a new, updated CD-ROM every week. But the people who want this data get a great deal of value out of it. They are financial analysts, on Wall Street, who want that data really badly, and want it in large volumes.

When they are looking at data about corporate performance, they're going to want to move a great chunk of data off the CD-ROM and into a spreadsheet on their computer—eighty or ninety K of data at a time. That's a lot more than a few bibliographic records. And the point is when they've got a network of computers, even hitching a CD-ROM drive to the computer network is not good enough, because there is too much data and they are all trying to get at it at the same time. They're very highly paid and you don't want to wait ten minutes loading the data from a slow-poke CD-ROM.

So what Lotus told me these people were doing with this data is dumping it off the CD-ROM. They receive the CD-ROM once a week and they copy it onto ordinary magnetic drives attached to local area networks - 400 megabytes of data! The magnetic drives handling this volume are from $30,000 to $40,000 on the local area network. Take note: they are only using CD-ROM as a *delivery mechanism* from Lotus to the user. They are not using it as an access method. And it's important to understand those two roles of CD-ROM: the technology is not necessarily as good for both things.

I said that mainframe and microcomputer engines, more powerful than microcomputer engines on their own, are the best way to do the crunching and the grinding that data searching requires. The problem is that the existing mainframe technology is not the best method to handle the other half of access—telling the engine what to do and displaying the results that the engine produces. That's what you've all come to know as the user interface. Mainframe computers are not a good way to handle fancy user interfaces.

Most of you have probably used microcomputer products such as Lotus 1-2-3, or good word processing programs, and this will be especially true if you've ever used a Macintosh with pull-down menus and clicking all over the place and moving windows around and all that kind of stuff. If you're familiar with that kind of microcomputer technology and interface, it will be frustrating to start working with Dialog where you have to give a new command to see a review of your searches, you can't back up in your data, you can't review things, you can't flip back and forth from function to function like you can with most microcomputer software.

Going from a good microcomputer interface even to a *good* on-line interface like Dialog's is like going from driving a Maseratti to pushing a wheelbarrow. It's simply not possible to develop on-line interfaces that are as good as those you can develop with a microcomputer, for a very fundamental technical reason. The reason is the thickness of the pipeline between where the data crunching is going on and where the display is going on.

In a microcomputer, running Lotus or dBASE III, the processing power is sitting effectively right behind the screen. When it needs to write information on that screen, or manipulate the information on that screen, it's got a great big, wide pipeline to the screen. It can move many thousands of bytes of data a second to the screen.

The problem with Dialog or any other online service is that it has a very narrow pipeline, one that can move data at only one or two hundred bytes per second. It's got a drinking straw between its computers and the screen on your desk, and it can't do very fancy manipulation of what's on your screen. The online service's interface is intrinsically limited by the thickness of that data channel. So all of the data channel's capacity is devoted to getting the bibliographic references or whatever they are to you. It is not devoted to the cosmetics of presenting it to you conveniently and attractively.

That leads us to one really significant conclusion: the right place to implement any cosmetics in any kind of data searching service or data delivery service is in the microcomputer. It's not at the mainframe end. If anybody wants me to do a little sidebar on this, ask me about iNET later on, if you want to know. So the place to put the interface is in the microcomputer, even though the place to do the searching is probably not in the microcomputer, but on a network somewhere, or on a mainframe.

I have a set of things that I would like the vendors of computer software and of data products to make available. I think they are possible and I think we all ought to be arguing for them. The first one is a good searching service interface built for a microcomputer. I

want a data access interface that's as good as the one on Lotus, or even better, as good as the one on the Macintosh: full use of the keyboard, graphics all over the place and use of the mouse if that's attached to the machine.

Nothing like this is available yet. The closest I've seen is Insearch (later ProSearch), which is not bad in the interface department, but it is not ideal for a number of other reasons. However, it's a move in the right direction.

Another thing I want to see is a seamless integration of information from all sources. "All sources" means on-line databases, it means CD-ROM attached locally to your computer. It means CD-ROM attached to the network that your computer is on and it means data that you have collected, created yourself, or downloaded.

I would like to be able to say, "I want such-and-so collection of data." And I want the software on my computer to reply, "Well, let's see now. Here's a little bit of it in the database that he's already downloaded from Dialog so we'll get that stuff there, and I know (because I've got a list of them) that one of the CD-ROMs in his collection contains another chunk of this data.

"But he's specified a date range that exceeds what the CD-ROM drive has on it." And so, because there is a cost attached to going on-line, the computer turns to me and says, "I can give you the following part of what you've asked for from right here. Now, do you want me to go on-line to get the rest?" And I say yes, and it automatically goes on-line, fetches the information, and presents the whole package to me.

Now, not all of this is available yet, but none of it is technically impossible. There are even a few examples of things that are moving in this direction. The SCIMate Universal On-Line Searcher that some of you may be familiar with integrates data that you have collected with data that's on-line and allows you to search your data and BRS and Dialog using a similar set of commands. The problem is that the set of commands that it makes available to you, at least when I looked at it, was not very good. It didn't give you access to the full power of any of the on-line services, and so far it doesn't bring CD-ROM in.

Another example of a move in the right direction is a product from Dow Jones News Retrieval and Datext called CD/Newsline, in which they integrate Dow Jones' on-line services with Datext CD products.

And Dialog sort of integrates on-line services with their own CD, though not very smoothly. I remember asking for a search on the ERIC CD-ROM database. I specified a date range to 1987, but the CD-ROM data ended in, I think, 1985. And all it did was report to me that it had no hits for 1986 and 1987. Well of course, it had no hits—the database ended before that point. But it didn't have the smarts to say, "I know there exists better data than that on-line, but I don't happen to have it right here. Do you want me to go and get it for you?"

Most of the problems with putting this kind of technology in place are not technical problems. They are marketing problems, and problems related to turf, to protection of parts of markets and protection of existing distri-

bution channels.

The main technical hurdle, and there is a technical hurdle, is that there is not a very complete set of standards for computer-to-computer communication. Remember I said that the pipeline between the on-line mainframe computer and your microcomputer is very skinny. That means it has to be used optimally. If that's going to happen you want your computer to talk to you human-to-computer, but you want your computer to talk to the Dialog computer computer-to-computer. You want your computer to say "10110101" and you want Dialog to say "101101011000010." That's not a friendly human interface, but computers have no trouble with that kind of interface and can move data very efficiently in that manner. They can compress data, and send a lot more data in the same length of time if they don't have to worry about cosmetics. Leave the cosmetics, the shaping of the screen, to my computer on my desk. It's got the power to do that. Use the skinny data channel optimally to deliver the data error free.

But this "cooperative processing" between micro and mainframe either requires joint development, or it means Dialog and folks like them have to create the software to put on your computer. But on-line services have not got a great record at creating really good microcomputer software, so I don't think that's the way to approach it. So we're talking joint development and specifically standards so that computers talking to each other, over a thin communications channel, talk the same language. Dialog's computer doesn't know or care which interface software you've got on your computer. All it knows is that you've got interface software that's compatible with its back door, with its computer-to-computer connection.

There's nothing sillier than one computer pretending to another computer that it's a human being, which is exactly how many of the front ends work now. They are all talking to Dialog through the interface that is meant to be easy for humans to use. That doesn't make sense.

There are definite problems related to turf and to marketing, to definitions of markets. One of the historical problems between information providers and middlemen like BRS and Dialog who sell information to the library community or to other users is that the information providers, the people who produce the databases, have never really liked the middleman because they stand in the way of communication between the provider and the user. If I'm an information producer and you are a user of my database, and Dialog is standing in between us, I can't talk to you in the way I'd like to, I can't get information back from you. The information providers have always been kind of unhappy that the online services didn't provide them with the kind of information about you that the information providers think they need to tailor and improve their product, and that sort of thing. So they've always chaffed under the yoke of the information services between them and you.

One of the things that CD-ROM provides them with is the ability to take back that distribution channel. So I think right now, especially if they have a distribution channel for printed material that goes directly from them to you, they're looking for ways to use those distribution channels and reclaim you as their direct customer.

This will make standardizing

of CD-ROM searching interfaces really hard. If I'm a database producer, one of the things that I'm going to try and do to make sure that you buy my CD-ROM product is do an interface that you really like. But my competitor is going to do another interface, which means you are going to have to learn how to use two interfaces.

Or somebody is going to emerge in the middle who's going to be an intermediary service. The best known one in Canada right now is Reteaco. They offer services to information providers to create discs, and the software for searching, and they make it possible for you to use several information products in a similar way.

Reteaco claims that they have no interest in becoming a middleman like Dialog. But if they don't, then every one of the CD-ROM vendors is going to want to tailor his product so it looks slightly different from the others. The only alternative is to put up with the emergence of a middleman like Dialog in the CD-ROM business, so you all have a consistent interface to all of our databases back here.

Neither of those situations is good for anybody. The vendors don't want to lose control of you as they already have in the Dialog environment, so they're resisting the middleman notion and they are using their interface as one of the ways to claim that they are better than everybody else. They have no interest in standardizing data formats or interfaces. At this point, they all think they are going to become the one who wins.

Basically, what is happening is that there is a fight over whose interests are going to be paramount. Is it the users' interest or the suppliers' interest? Right now, the users hold the cards and don't know it, so the suppliers are getting away with quite a bit and there's a lot of probing and jockeying for position in a volatile market.

One of the things that I think the user community really ought to be doing is insisting on flexibility, refusing to purchase proprietary technology. You should be insisting on flexibility as in the PC standard. You should be insisting on flexibility as in the High Sierra standard for CD-ROM discs. You should be looking for non-proprietary technology.

You should also be supporting standards. Standards are ultimately in the users' interest. Standards that allow different products to talk to one another, different products to interchange information with one another, are in the interests of users and you ought to be supporting them. You ought to be looking for people who say, "We adhere to standards," and they really are standards.

The other thing you should be doing is grousing and complaining a lot. When you see a product that somebody is trying to sell you, you should be looking for limitations in that product and complaining about them when you see them. The vendor is going to be sure to tell you about the good points. So when you are looking at a product, your job is to tell him what he has not delivered, because that's the only way he's ever going to do it.

If you think something ought to be possible with any kind of information product, then it probably is and it's just not yet in the vendor's interest to

build it into the product. So you ought to be pushing harder and insisting that you get the product that you want and you get the features that you want.

Above all, expect these technologies to merge. Don't think that you can live in one of those layers, because you can't. Increasingly, you are going to be working in all of these layers simultaneously and you are going to be seeing products and services emerge that pull them together. So be ready for it and take advantage of it when it comes.

INFORMATION: A RIGHT OR A PRIVILEGE?

Ken Dowlin, Director, Pike's Peak Library District

Ken Dowlin was the Director of Pike's Peak Library District in Colorado Springs and is now Director of San Francisco Public Library. He invented Maggie's Place, an internationally-renowned, people-oriented computer system, and he pioneered the concept of direct computer access between home and library. Mr. Dowlin is the author of *The Electronic Library*, published in 1984 by Neil-Schuman Press.

What I would like to do today, is to share some of the concepts and ideas I've developed in more than twenty-five years of working with technology in libraries. In that time I've always tried to put the tools into the context. It's critically important that as we get more and more tools, we have to learn to deal with them in a rapidly changing environment.

I don't really plan to talk about Maggie, other than to tell you Maggie is healthy and well. She's running 230 terminals now in the library and we're just getting another grant from the Urban Mass Transit Authority to buy another Maggie, so that we'll have about a 600-terminal capacity in our computer system. So Maggie's doing well. The latest issue of *Library High Tech* has a major article on Maggie III which is the new generation. So if you want to look that up, you can read about the details. Good article. I wrote it.

Also, I don't plan to talk much about the Pike's Peak Library District. I know some of you are not very familiar with the Pike's Peak Library District, but we are having a very interesting year because we opened a new building on January tenth, our budget doubled January first and in the last three months we have hired eighty-four new employees, thereby increasing our staff eighty per cent in the last two months. It's been very hectic around Colorado Springs, but it's a fun type thing. Our book budget just about tripled overnight. So the Pike's Peak Library District is doing very well.

One of the fun things about being the Director of Pike's Peak Library District is the freedom it gives me to focus my attention. I have a board and a community and a staff that allow me to spend quite a bit of time thinking about the future of libraries, and in particular, the future of the library in Colorado Springs. Of late, I've been spending a lot of time hopping about. I've been overseas three times in the last three months. As a result I'm getting a lot of cross-cultural input. Being here in Canada, I find that although we're very similar in many ways, we also have different perspectives on a variety of things.

One of the things that always gets in my way when I start trying to deal with the library of the future, is my pragmatism. Because I tend to be very pragmatic in my approach, the only way I know how to deal with the future is through something that I call a "linear progressive model." Very simply that means we look at the past, we look at the present, and we guess at the future.

I do think that by looking at the past and the changes that have taken place in certain eras, we can get a better feel for projection. The context that I really use is my own father's lifetime. He was born in 1898. (I'm sure you have fathers or grandfathers or someone who is of that era.) Just try and think of the changes that have taken place in their lifetimes.

In 1898, how many communications channels were there? How many are there now? Hundreds. Think of all of the variety of technologies that have come into play. The computer is barely twenty-five years old for all practical purposes. A lot of things happened in my father's eighty-four year lifespan. I cannot really project eighty-four years, I just don't have that capacity. But maybe if I say, cut that down, compress it, maybe in twenty years we may be about the same rate that happened in eighty-some years, because change continues to accelerate.

I like to think past, present and then dabble with the future. I've done that with libraries and particularly with my true love which is public libraries. But I think it can have some validity to academic libraries, school libraries and all that.

I think we can agree that in the past, libraries tended to concentrate on archival functions. We would collect materials and worry later on about how to store them, and how to retrieve them. That's changed a great deal. I think today we see libraries pre-occupied with the concept of linking. Not only do we store things, but we reach out to connect other libraries, to connect other people. In Colorado Springs, more than three thousand homes connect directly into Maggie through their dial up microcomputers.

Where do I think we may be going in that particular stream? I think more and more we will see libraries becoming learning institutions. I see that as a positive.

The reason I use the word "learning," is because I've given up on the library, the public library particularly, as an educational institution. Most of you recall that when the major public libraries were formed, they were the universities of the poor. The idea was that people could become self-educated by going to libraries and reading. That's still a valid function, but I call it learning because today to be considered educated, you have to have credentials. You could read every book in the Toronto Public Library and you still would not be hired to teach anywhere. You need to have credentials. So to me, what is happening to libraries is that we've had to sort of let go of the concept of the library as an educational institution, except where it is supporting an educational institution, and look at it as a learning institution.

How does this all relate to process? As I mentioned, in the past we tended to concentrate on collecting things. Well, today that's changed and now we're concerned with communicating. One of the fun things about all of this technology stuff is the more we computerize, which really means we digitize, the easier it is to communicate. A common element in integrating technologies is digitization as the way to store content. There is digital audio and digital video, and of course computers store digitally. Once you start doing that, you start being able to move through these things, and that's a very important factor.

My teenage son learned a long time ago that a cheap, mass storage device for the PC is the VCR. You can store stuff on the VCR. In fact, in Ann Arbor they're building a device to store documents for the Ford Motor Company that uses a facsimile machine as input, the PC as the system administrator's retrieval system, and then a half-inch VHS VCR as the storage unit. So they've integrated all three of those particular technologies.

Where are we going to go with this? Your guess is probably as good as mine. What I see happening is this: as we get better and better at communicating, communities will see the library as a leading institution in the entire area of information and access to information. And if we think of libraries as learning institutions that will be leading institutions in the whole area of access to information, we get a clue as to where we should be focussing our energies.

One of the things I've been trying to deal with for more than twenty-five years is how to keep the library from becoming obsolete. How do we keep the library from becoming a backwater institution? In a society that is changing, that is very dynamic and is embracing new technology head-over-teakettle, how do we keep up with all this? Are there any common elements?

How many of you are familiar with Maslow's hierarchy of human needs? Maslow's hierarchy of needs is biological/ physiological needs, security needs, social needs, ego needs and self-actualization. For years I struggled over a definition of self-actualization, and I finally decided that if everyone actualized himself, we'd have anarchy. But I have decided that my self-actualization is to be branch librarian in Tahiti—a hammock, a little grass shack and all that, with a PC and a satellite link.

There is a man named Forrest Woody Horton (he's done a lot of publishing), who started out with microforms. I first ran across him when I joined the American Microfilm Association. He did a lot of work in microfilm and then he moved into information retrieval. Horton, in almost a throw-away article in the ASIS Bulletin in April, 1983, came up with a chart on which he structured the information needs of the human being as coping information, helping information, enlightening, enriching and edifying. I think that's an interesting scale. It's one of those things I think I'll try to develop further when I'm in my hammock in Tahiti.

The point, and the point I'd like you to take home with you, is the traditional library has been focussed at the top of the pyramid. Basically we have concentrated on collecting literature, art, and the types of things that are edifying and enriching and enlightening. Now the bottom line on Maggie is using Maggie to build our systems to come down to coping. Maggie for example, keeps track of all the daycare centres for children in Colorado Springs, keeps track of all the clubs, all the agencies, all the adult education courses, does the carpooling for the Metro area, keeps track of the city buses. We're bringing up a new database now that will include the care providers for senior citizens.

Those kinds of things provide coping information and bring people into the library, either in person or by remote, who would never use the library for edifying and enriching.

The other thing that I want to leave with you is the idea that access to information should be a human right. I think it's time that the American Library Association (ALA) started working on a definition. So I've been thrashing this out for a number of months now, trying to define and articulate this concept of access to information and knowledge as a human right.

I started with the question: why do people need access to information and knowledge? I put some words together that I would like you to roll around in your head a little bit.

First of all, and this is probably being very optimistic, almost Pollyanna-ish, but people need access to information and knowledge in order to learn lessons from history in hopes that mistakes will not be repeated. I'm not sure I'm that optimistic, but it would be nice.

Second, it's becoming more and more important for the library to be a vehicle that allows people to gain a sense of belonging from knowing the culture of their ancestors. We also think that it is important for people to cultivate pride in themselves and in their community. And in a democracy, it is important for people to have access to information and knowledge in order to select those who govern.

We're very concerned in Colorado Springs because forty per cent of our work force turns over every five years. Bet you can't guess what our number one industry is? Have you ever heard of NORAD? The number one industry in Colorado Springs is military, for better or for worse. Number two is computer component manufacturing, and those people are particularly unstable in their work patterns. Number three is tourism. So you take military, computer manufacturing, and tourism, and you have a very volatile population.

In a consumer oriented society, it's also extremely important that people be informed consumers. One of the exercises that I thought might be fun is to add up how much money is spent in a year trying to convince us to buy something that we don't want or need. Balance that against all of the impartial, objective sources advising us on what things we actually need and should buy. What do you think the ratio would be? One to a million, probably.

I think another element that makes providing access to information and knowledge important, is it allows us to care for our bodies and minds. I think information and knowledge can allow us to understand that as far as the environment is concerned, today's actions will affect the future.

What I'm trying to say is, I think access to information and knowledge is such a critical factor in our communities and our societies that as librarians we really need to focus on it.

What are the barriers to information and knowledge? After all, there's something like 26,000 commercial messages in the air in any day in the United States. That's a lot of information. I often wonder where it goes—maybe up to Mars so the Martians can sit there sorting through it. They probably put it on big laserdiscs or something and someday they're going to send it back to us.

I've come up with six specific barriers that create major problems in

terms of access to information. Some of them are obvious and some of them are not quite so obvious.

The first one is what I call legalistic barriers. There are some governments who feel chauvinistic about trans-border data flows and so they actually create barriers to keep data from moving between countries. There are also a lot of information producers who have what I call irrational expectations regarding ownership of information.

I think the ultimate example of this irrationality occurred when movie producers in Hollywood sued Sony for inventing and selling a VCR because people could use the technology to tape things. Now to me, that's one where the good guys won. We can tape whatever we want in the privacy of our own homes. I think it was irrational of the movie people to expect that the Supreme Court would rule that Sony couldn't sell VCRs, unless they added a ten per cent tax to every VCR unit because people were going to copy movies.

The third factor in the legalistic sense, at least in the United States, is the time lag. It takes the American Congress something like seven to twelve years to deal with a copyright revision. You know what has happened in the last seven to twelve years in terms of copyright. We're seeing a sort of deja vu with the DAT, the digital audio tape. People are now saying they are going to use that technology to rip off our discs and so you shouldn't sell it in the United States. So we're going to see a go-round again and probably, like most people, DAT has decided the way to protect itself in that kind of environment is to go to Congress and get them to pass a law.

In the United States better quality television sets just doubled in price because we put a hundred per cent tariff on Japanese televisions. It's really interesting because they only put the tariff on things that are made by the Japanese. So what it means is you just double their price. The rationale escapes me.

In the United States you can pick up any library journal or magazine and read commentaries on the privatization of information. I would not say that I am totally opposed to it, on the other hand I have some real worries about the way the current administration is approaching it. They're doing the wrong things for the right reasons. Their major tool for privatization, or one of their major tools, is the Paperwork Reduction Act. How can you complain if the goal is to reduce the amount of paper they produce?

How do they reduce it? Well, they go to the agencies and say, "You've got to lop off so many documents." Which documents do they lop off? They lop off the ones that people want. Why do they do that? So that they'll scream at Congress and Congress will scream at OMB. It's a vicious circle. But privatization is an issue that ranks up there with contracting out federal libraries. In the U.S., the State Department library is run by a Dutch company. I kid you not. What would happen if the KGB was the low bidder on the CIA library? They'd probably give it to them.

The last legalistic barrier is governments who feel that citizens have no right to read, hear, or see information that is not approved by the government. Fortunately, we live in countries where that is not a major problem. There are

countries throughout the world which implement censorship on a regular basis.

The second type of barrier to information and knowledge revolves around the competitiveness of the corporate milieu. The problem in dealing with consumer products is the old recall issue. You are probably familiar with the uproar over a certain German car that goes bashing through garages. Obviously, the car company would prefer it if people didn't realize there is a problem with that car. And obviously, the people who go bashing through the garage would like to know that the car has a problem.

The third barrier is really ironic. Technical factors can create key barriers in themselves. For example, polls show that in the United States, and I suspect probably in Canada, the majority of people get their news through television these days. Television is almost totally an ephemeral media, so we're creating an environment where the main source of people's information, or at least one of the main sources of people's information, is not particularly accountable to anybody.

Now in the United States, Vanderbilt University does collect the network news programs, but virtually no one collects the local news. Is your local news collected, stored and indexed so that you can go and find out what they actually showed last week? When I was in Casper, Wyoming and we dealt with cable television, the local broadcast would give us their news film and we stored that. That was really kind of a pain, but we found out the value of that when we had a big trial in Wyoming involving a rancher who hired helicopters so he could shoot eagles. Can you imagine hiring a helicopter at four hundred dollars an hour to shoot birds? They were doing that and of course the federal government got upset because you can't shoot bald eagles in the United States. Reporters from New York descended on our library and they went through the film.

Well of course what happened is that technology moved on and they now use videocassettes instead of film. And what happens when they run out of videotapes and they re-use them? The record is gone. We're almost in a catch-22. They've created an environment where one of our major sources of information has no particular accountability.

The fourth barrier is the lack of technical standards. Some of you may know I was the president of LITA, the Library Information Technology Association, and my big soapbox that year was technical standards to interconnect systems. That's a whole lecture so I won't get into that, but suffice it to say I think that it is a professional responsibility to develop those standards, not a vendor's responsibility.

A lot of people don't know how to use the technology. That, I guess, is one of the neat things about television. You walk over and turn it on and something comes down the pipeline. But a lot of people don't know how to deal with microcomputers and information retrieval systems.

A lot of people say we're going to have PCs on our desks and have immediate access to all 2,800 of the on-line databases. You people who do on-line searching know there isn't a common search strategy, and that you have to have contracts for all of the various data bases. To me, the electronic on-line

information milieu of the future is a jungle, and it probably will not get much better. So there will always be a need for people who will take the responsibility for teaching people and assisting people in this. Another barrier to everyone doing online searching is simply a lot of people just don't have the equipment.

What I would like to propose, is that every citizen should be provided with a minimum level of access to information and knowledge. And this is one where I want your help. If you think of ideas, I would appreciate it if you would drop me a note.

For example, I think people should have access to information if it is relevant to issues that will be decided by voters; I think people should have access to information if it pertains to candidates for public office; if it's information that's essential for individuals to cope with their environment; if it's information about their governments, federal, state and local.

I certainly think people should have access to information if it's relevant to their consumption of the basic necessities: food, transportation, medicine, and housing; if it's information to improve health and to increase safety; and if it's information to increase employment and enhance careers. Now, roll that list over in your minds in the next couple of days and send me a note if you think of some other ideas. I think that as a democratic society based on human values, we should take a stand on providing that kind of information to everyone.

One thing that I have a lot of fun with in working on the library of the future, is the agreement between the Pike's Peak Library District, the Leicester Polytechnic in Leicester, England, and the Bibliotheque Publique d'Information at the Georges Pompidou Centre in Paris.

The three institutions have agreed that we are going to do three things. We're going to exchange staff, and we've already done that. We've had some staff over in Paris and I've found that's a really good incentive. If you do a good job this year, I'll give you a month in Paris. We're finding they're not quite as excited about Leicester, England. It's a nice place but Paris is a little more exciting.

Secondly, we've agreed that we would have a rolling conference and we've actually started that. The first conference was in Leicester ten days ago. It was on using telecommunications to provide library services. The second conference will be in Paris, December third and fourth, and the third one will be in Colorado Springs in May, 1988.

Now, the Brits' conference was geared to hardware, LANS and WANS and bits and bytes and modems and all that stuff. In May, 1988 at the Pike's Peak Library, we're going to focus on applications, because one of the unique things with Maggie is the wide range of applications that we run on the system, and the fact that we provide access directly to the home.

Guess what the French are going to talk about? They are going to talk about why, why do you want to do it. It's been fun working with them because one of the things that they're doing is building an exhibit at the Pompidou Centre that will be four thousand square feet. They hope to spend four million francs, which is seven hundred thousand dollars today, on the library of the future.

One of the things I've been wanting for years is a really good picture of the library of the future. I wish I did have one to show you, but the French are going to build this exhibit and we may have a connection from Maggie over there so they can use a terminal.

They're taking a very interesting approach to this exhibit. They've hired a computer programmer to write a program that will teach you to be a creative writer. I'm interested in this program. It's not a word processor or a Spellstar thing, it's a creative writer generator. I'm waiting to see how that works.

The idea is that they will have a room and they will have a laboratory, and people will be in there writing on the computer. But they go beyond that because the room will have glass walls and will be an exhibit for the five million expected to go through the museum during the exhibition. So they are using a laboratory as an exhibit. Only the French would come up with something like that.

I'm trying to help them come up with ideas of what should be in the exhibit and how it should look. Now, I really don't know yet. We're going back and forth on static displays, moving displays, and so on. But the woman in charge of displays, Catherine Counot, is a very sharp, charming lady, and she and I can argue about a few things. One of them was when we said what do you want this exhibit to do, she said, "Well, we want the library of the future to be utopian." I said, "Now Catherine, in the U.S. when you say utopia, we tend to think of H.G. Wells or George Orwell." So we found there are some cultural differences there.

But in working with that, the term I came up with for the library of the future is something I'm calling "Bibliotopia." I still don't know what Bibliotopia looks like, but I'd like to leave you with some elements that will have to be in place for Bibliotopia to be good, as opposed to repressive. You can probably think of others.

I think for Bibliotopia to be a positive force in our community and in our societies, there are some things that will have to be done. Number one, I said would be a return to technical standards. I think that the professional association has to be involved in the creation of technical standards of interconnection. It may simply be data transfer standards, or it may simply be packet switch type standards, but we need to be involved and we need to take a stand.

What would have happened if twenty-five years ago we had all said we won't buy a computer system before its time, no, before it is connected. We need technical standards to compare not only a brand X computer with a brand Y computer, but to go from optical discs to PCs to VCRs to what have you. And I think that's our responsibility as librarians.

I think number two, and this is not new, we have to continue to have advocates. Creating access to information and knowledge will not happen by default. As individuals, we have to continue to advocate it as a function of our governments.

Number three: structuralists. What I mean by structuralists is cataloguers, indexers, people who bring organization out of the masses of information that's available. Over decades,

probably one hundred, two hundred years, we've built the system related to acquisition and processing of books that is years ahead of compact discs, for example, or optical discs. If I need a book, I tell my order librarian and she sends it probably to Baker and Taylor, Baker and Taylor sends us the book, sends us an invoice and it's done.

How do you go about buying an optical disc system? You certainly don't call Baker and Taylor and say send me one of these. So we have to build the infrastructure to deal with these things. How about computer software? Now it is getting easier because we're sort of down to either it's a PC or an Apple. I can remember back when there were thirty-five different kinds of machines out there. So we need to build structures to deal with that, we need to build indexing systems.

One of the things that we're having a little problem with now is the fact that on Maggie you can go skipping through the files. You can do a search on the PAC (Public Access Catalogue), you can repeat that search in a local documents file, you can repeat that search on a club file, a courses file, a daycare centre file if you want to, and then bounce into the CARL System in Boulder or in Denver and search it on the University of Colorado PAC, et cetera. So they've come up with something they call global search, which means you put in your search and it will look through all of those files and come back.

We're just starting to learn what happens when the average public library patron walks up and puts in "history." Do they really want 40,000 history citations? No they don't want 40,000 history citations. How do we structure all of this stuff. We all go through it. All they really wanted was a red book for the coffee table for the Christmas party or something. If LC could put the colour of the book in the MARC record, it would be one of the biggest helps. Anyway, we need structuralists.

Number Four. We also need high touch. I don't need to spend much time on that. You're familiar with the concept that John Naisbett developed in *Megatrends*. He said that whenever new technology is introduced into society there must be a counter balancing human response which he called high touch. When we opened the new building in January, we had five thousand people come to our library on the first day. When we asked them why they had come, what do you like about the library, they said, "It feels good."

Even though they could sit at home and search the FACTS database and all that, they still came to the library because it felt good. So that will be important and I'm one of those people who believe that library buildings will be around for a long time. They may be social gathering places or places for people who have no place to sleep, but they will be around for a long time.

Number five, and really in a library audience I don't have to talk a lot about this, is public subsidy. To me, the function of a publicly-funded library is to provide publicly-subsidized access to information and knowledge. It's as simple as that.

I think we need to build the global village library. I want to build a library where any person, through his or her own library, can have access to the

information and knowledge in any other library world-wide.

It's only taken me twenty-five years to get the French and the Brits working together with us, so it's got a long way to go. But don't you think it's a neat idea? If we could bypass the news media, or we could bypass the government, and just ask questions. We're going to do that with the BPI and Leicester. We've agreed that we'll all be on ALANET (the American Library Association Electronic Mail System) and send reference questions to each other. And we've agreed that if we get a reference question from the other library, we will answer it and send it back through ALANET. That's a very modest beginning and in truthfulness, it may be more public relations than practical value. But I'm finding people in Colorado Springs who are talking about this idea of the international electronic reference. They get really excited and I think that's neat.

I think that individual access to the knowledge and information in other countries can create understanding. And if we can create understanding, I think we can build a better world.